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UNITED STATE DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SOIL SURVEY OF BUREAU OF LAND MANAGEMENT LANDS, CHAVES COUNTY, NORTHERN PART

BLM Work Order No. 1, FY 1977

BLM-SCS Cooperative Agreement No. NMSO-51 dated May 18, 1976

met or exceeded (SOW)

Comment written to Director NM
3/8/78

Information contained in this interim report
is preliminary and subject to change.

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INTRODUCTION

The preliminary report presents information about the soils within and in the surrounding area of the 116,000 acres of contracted soil surveys between the Soil Conservation Service (SCS) and the Bureau of Land Management (BLM).

The information presented in this report is in conjunction with the soil survey for Chaves County Northern Part. It is important that the user understands that needed changes will be made prior to the completion of the soil survey. The intent is to furnish advance information for use and testing.

Information is presented in 12 sections. The following sections are in the format as required for the completed soil survey: Description of the area; Rangeland, section of the Use and Management; Descriptions of Mapping Units; Representative Soil Series Descriptions; Soil Series Taxonomic Listing; Conventional and Special Symbols Legend; and Glossary.

The BLM requested the following sections to be included: Soil Surface Factor and Effective Rooting Depth; Range Sites by Mapping Units; Soil Phases by Range Sites; Range Site Descriptions; and National Soil Series Descriptions and Interpretations. These sections furnish advance information that is normally in a completed soil survey, except for the Soil Surface Factor and Effective Rooting Depth section.

The information in the Soil Surface Factor and Effective Rooting Depth section was collected and determined jointly by a Soil Conservation Service soil scientist and a BLM specialist. BLM definitions and procedures were used.

The SCS Range Site descriptions were included to provide more detailed range information than what is given in the mapping unit description. It is important that the user understands that these descriptions are in a preliminary stage and are to be tested for a period of a year before they become final. It is also important to stress that the vegetative listings are based on the potential (climax) situation. Range site descriptions not available are: High Lime HP-3, and Sandhills HP-3.

All soil series used in the survey will not occur in the National Soil Series Descriptions and Interpretations section. The soil series with the word like in the name are soils that need to be established as a national series or correlated into another soil series. The concept and interpretations for these soils will be developed as the survey progresses. The user needs to understand that the interpretations do not eliminate the need for onsite investigation. The potential native plant community information is probably the most inaccurate data on the interpretation sheet. The SCS range site description is more accurate and should be used. This part and the other soil series interpretations will be tested and updated as the survey progresses.

DESCRIPTION OF AREA

Chaves County, Northern Part, is in the northern part of Chaves County, New Mexico (Fig. 1). It is bordered by Lincoln County on the west, De Baca County on the north, and Roosevelt and Lea Counties on the east. The area has a total of 1,851,233 acres, or approximately 2,893 square miles. Elevations range from about 3,400 to 3,700 feet along the Pecos River to 4,700 feet in the east on the High Plains and 4,300 to 4,700 feet along the Lincoln County line.

The Pecos River runs through the central part from north to south. The Salt Creek, Macho Draw, and Higgins Creek drain into the Pecos River from the west.

No major community occurs within the area. Communities with sparsely concentrated populations are Mesa and Elkins. Roswell, the County Seat, serves as a commerce center. No schools are in the area. Three Federal highways, U.S. 70, 285, and 380, and the Atchison, Topeka, and Santa Fe railroad traverse the area.

Most of the land is range, with about 10,600 acres irrigated cropland. The cropland is mostly in the southcentral part. The principal crops grown are alfalfa, cotton, grain sorghum, and small grain.

Chaves County, Northern Part, is covered by two Natural Resource Conservation Districts. These are the Border and Chaves Districts. The districts were organized so that farmers and ranchers could effectively control water and wind erosion, overgrazing grassland, and the invasion of brush and noxious weeds. They also recognized the need for increasing the number of watering places for livestock and conserving irrigation water.

Chaves County, Northern Part, consists of about 507,260 acres of public lands, 949,369 acres of private lands, and 394,604 acres of state lands. Figure 2 shows the approximate location of the 116,000 acres of public lands soil surveyed to dated, contracted with the Bureau of Land Management.

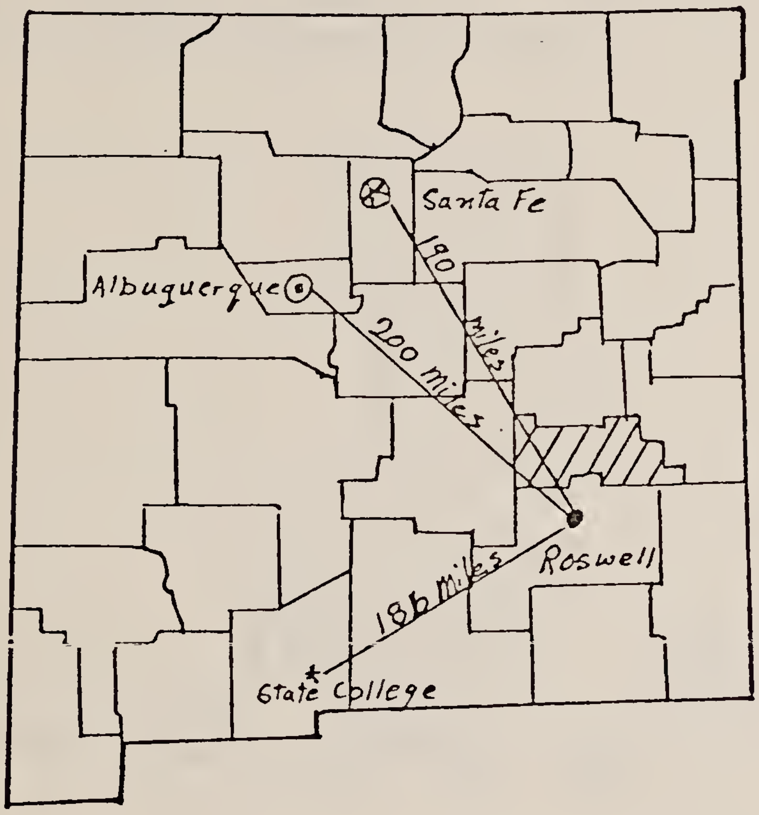
Santa Fe
190 miles
Albuquerque
200 miles
Roswell
186 miles
State College

FIGURE 1 --- Location of Chaves County , Northern Part in New Mexico

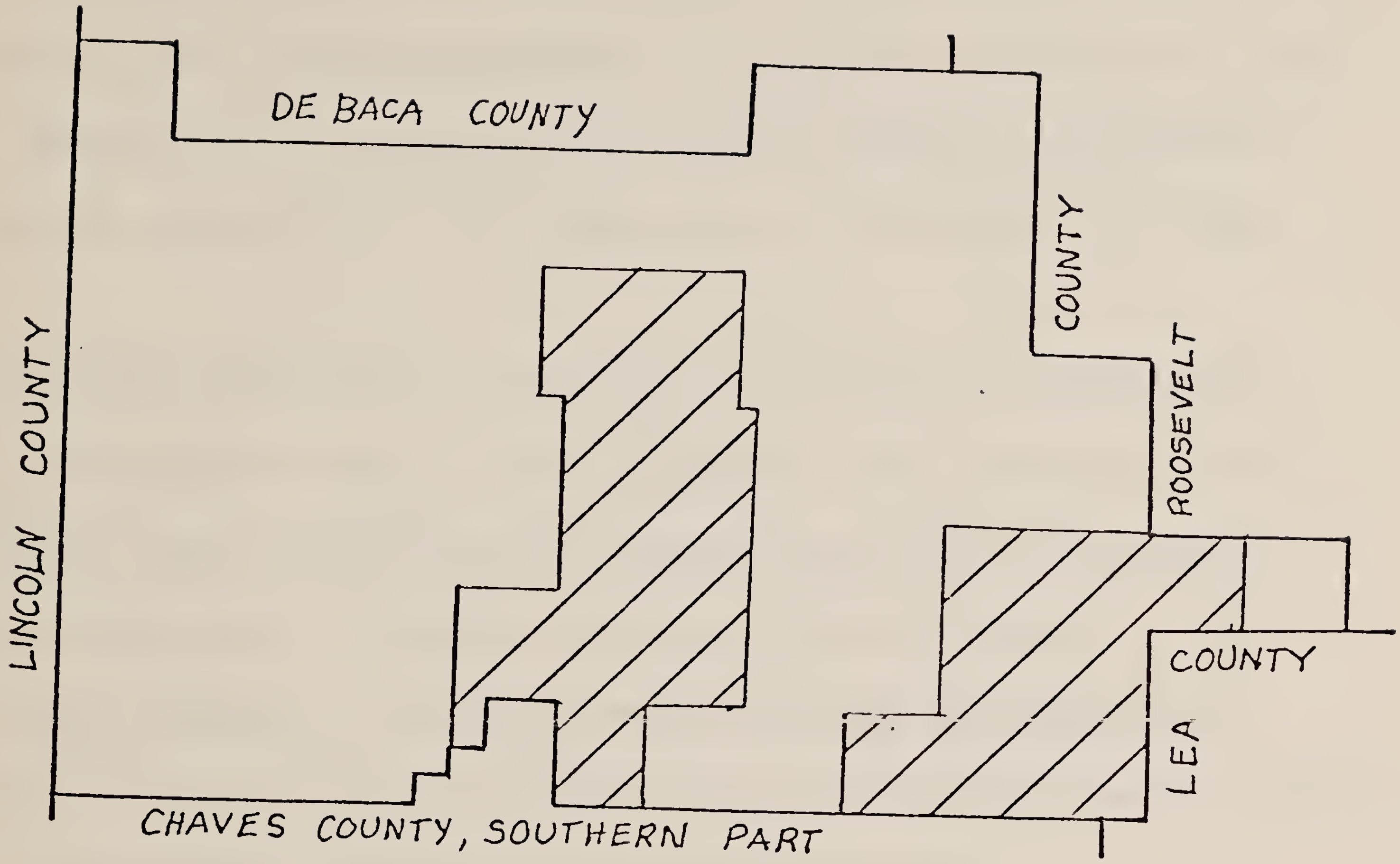
DE BACA COUNTY
LINCOLN COUNTY
ROOSEVELT COUNTY
LEA COUNTY
CHAVES COUNTY, SOUTHERN PART

FIGURE 2 - - Location of the Bureau of Land Management contracted acres

RANGELAND

The major use of the land in the survey area is livestock grazing. Cow-calf operations are dominant throughout the survey area; however, many ranchers have yearling operations in the northern and eastern parts of the survey area. In the winter the natural forage is supplemented with protein concentrate. The average size of the ranches is 15,000 acres.

The native vegetation in most parts of the survey area have been greatly depleted by drought, insects, diseases, and continuous excessive use. Much of the acreage that was once open grassland is now covered with brush and weeds. The amount of forage produced may be less than half of that originally produced. Productivity of the range can be increased by using management practices that are effective for the specific kind of soils and the potential native plant community.

Where climate and topography are about the same, differences in the kind and amount of vegetation that range can produce are closely related to the kinds of soils. Effective management is based on the relationship among soils, vegetation, and water.

Each soil mapped has a distinctive plant community that differs from others in its potential to produce different kinds of native plants. The potential plant community is characterized by an association of species as listed in the description of the soils under each mapping unit. Each soil mapped has been correlated to a name of a range site. Range sites have been assigned both by series and mapping unit components. Thus, to get full information about the vegetative community and its management, it is necessary to read both a description of the mapping unit, the use and management in this section, and the range site description. The range site provided is a description of a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic, natural plant community.

Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. Range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to hold and yield moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and beneficial water runon are also important.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to manage grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The major management concern on most rangeland is to manage the time and the intensity of grazing so that the kinds and amounts of plants that make up the potential plant community are reestablished. Forage production is less than half of the potential because the natural vegetation in many parts of the area has been greatly depleted by continuous and excessive use. Brush, weeds, and cactus have increased or invaded on much of rangeland, causing further depletion of the grass cover. Soil erosion generally occurs when soils are not adequately covered.

A proper degree of grazing use combined with a system of deferred grazing which varies the seasons of grazing and rest in pastures during successive years is needed to maintain a healthy balanced plant community and provides a higher quality forage throughout the year. Periodic rest during different seasons of the year benefits different plants. Winter rest benefits shrubs, such as shinnery oak, winterfat, and fourwing saltbush. Winter rest is also beneficial to black grama. Cattle show a definite preference to black grama during the late winter and can easily overgraze this species. Rest during this period will reduce the grazing pressure on black grama. Rest during the spring (April-June) benefits early forbs and cool-season grasses such as New Mexico feathergrass. Summer rest (July-September) encourages the production and reproduction of warm-season grasses, such as sideoats grama, little bluestem, black grama, sand bluestem, and blue grama. Summer rest allows the cool-season grasses to complete their growth cycle. Fall rest allows the warm-season plants to mature and complete the growth cycle.

Flexibility in livestock numbers and in the frequency and intensity of grazing is essential to the success of any grazing program. Effective livestock distribution is most frequently accomplished by the use of fences, wells, pipelines, tanks, and livestock salting.

10 -- Reeves like-Holloman like association

This association consists of well drained, undulating soils on high terraces in the southcentral part of the area at elevations of 4,000 to 4,500 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The reeves like loam, 0 to 2 percent slopes makes up about 50 percent of the mapping unit and is on the depressions. The Holloman like loam, 0 to 2 percent slopes makes up about 20 percent and is on the depressions in association with the Reeves like soil. The Holloman like loam, thin solum, 0 to 3 percent slopes makes up about 15 percent and is on the low knolls.

Included with this association in mapping are small areas of Gypsum land, Quay like, and La Lande soils and soils moderately deep to shale. These inclusions make up about 15 percent of this unit. The gently undulating Gypsum land is exposed gypsiferous beds and is on the knolls intermixed with the Holloman like thin solum soil. The nearly level Quay like and La Lande soils are on the depressions in association with the Reeves like soil. The nearly level soils moderately deep to shale are on scattered areas. The included soils have similar vegetation as the Reeves like soil.

The Reeves like soil is moderately deep to gypsiferous material. It formed in loamy calcareous alluvium high in gypsum.

In a typical profile of the Reeves like soil, the surface layer is reddish brown loam about 7 inches thick. The subsoil is yellowish red and reddish yellow clay loam about 23 inches thick. The substratum is pink gypsiferous loam and red gypsiferous clay loam to about 60 inches. Below this, to a depth of 60 inches, is reddish yellow and yellowish red gypsiferous sandy loam and loam.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 24 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Holloman like soil is shallow to gypsiferous beds. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman like soil, the surface layer is reddish brown loam about 3 inches thick. The subsoil is light reddish brown clay loam about 11 inches thick. Below this is pink gypsiferous sandy loam and light reddish brown and red and gypsiferous sandy clay loam to about 55 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 14 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Holloman like thin solum soil is very shallow to gypsiferous beds. It formed in loam calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman like thin solum soil, the surface layer is reddish brown loam about 5 inches thick. Below this is pink gypsiferous sandy loam and light reddish brown and red gypsiferous sandy clay loam to about 48 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 5 inches. Surface runoff is medium, and the erosion hazard is high from wind and moderate from water.

This association is mainly used for range.

The potential native plan community on the Reeves like soils consists mainly of tobosa, black grama, blue grama, alkali sacaton, sideoats grama, threeawn, and a variety of perennial and annual forbs. The potential native plant community on the Holloman like soils are tobosa, black grama, alkali sacaton, threeawn, blue grama, and a variety of perennial and annual forbs. The potential native plant community on the Holloman like thin solum consists mainly of gyp grama, gyp dropseed, black grama, alkali sacaton, coldenia, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of black grama, blue grama, and alkali sacaton on the Reeves like and Holloman like soils. Special care must be taken to prevent loss of cover on the Holloman like thin solum soils due to the shallowness of gypsiferous materials. Grazing management on the Holloman like think solum when in association with the Reeves like and the Holloman like soils should be to maintain the plant cover. As the plant community deteriorates on the Reeves like and Holloman like soils, black grama, blue grama, and alkali sacaton will diminish. Species such as tobosa and threeawn will increase on the Reeves like and Holloman like soils. On the Holloman like thin solum soils gyp grama, gyp dropseed, and coldenia will increase as the community deteriorates. This is usually accompanied by loss of plant cover, which in turn accelerates the erosion causing gyp outcroppings.

Range seeding is not suitable on these soils due to the low probability of precipitation and very shallow soils. Mechanical brush control of mesquite is limited to the deeper Reeves like soils. Chemical brush control is suitable on all the soils in this mapping unit.

Earthen ponds are generally not suitable due to the shallow depth to gypsiferous materials.

11 -- La Lande-Quay like association

This association consists of deep, well drained, undulating soils formed in loamy calcareous alluvium on alluvial slopes in the western part of the area at elevations of 3,900 to 4,500 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The La Lande loam, 0 to 2 percent slopes makes up about 50 percent of the mapping unit and is on the depressions. The Quay like loam, 0 to 3 percent slopes makes up about 40 percent and is mainly on the low ridges and will be on the depressions.

Included with this association in mapping are small areas of Blakeney, Bascom, and Quay like thin solum soils, and a clayey-textured soil. These inclusions make up about 10 percent of this unit. The moderately undulating Blakeney and Bascom soils are on the gravelly ridges, and they restrict mechanical practices. The gently sloping Quay like thin solum soils are on the ridges. The clayey-textured soil is on the floodplain and receives runon. It is suited for pit tanks and has a thick stand of tobosa grass.

In a typical profile of the La Lande soil, the surface layer is yellowish red loam about 6 inches thick. The subsoil is red and light red clay loam about 24 inches thick. The substratum is red loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is moderate from wind and slight from water.

In a typical profile of the Quay like soil, the surface layer is yellowish red loam about 6 inches thick. The subsoil is reddish yellow and light red light sandy clay loam about 47 inches thick. The substratum is light red loam fine sand to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is medium, and the erosion hazard is moderate from wind and water.

This association is mainly used for range.

The potential native vegetation on both soils consists mainly of blue grama, tobosa, black grama, sideoats grama, alkali sacaton, threeawn, and a variety of perennial forbs. The total annual production on the La Lande soils will be greater than that of the Quay like soils due to the additional water received from the runoff of the Quay like soils.

Grazing management should be designed to increase the vigor and reproduction of black grama, sideoats grama, and blue grama. As the plant community deteriorates, these species diminish. Plants that occurred in the plant community in smaller amounts, such as tobosa, green muhly, threeawn, fluffgrass, broom snakeweed, and annual forbs, will increase. Burrograss will easily invade these soils as the plant community deteriorates. Woody species such as mesquite and cholla cactus will easily invade these soils where seed source is available.

Range seeding is suitable on both soils. However, care must be taken due to the low probability of precipitation. Adapted species suitable for range seeding include improved variety of blue grama, black grama, and sideoats grama. Chemical and mechanical brush control of cholla cactus and mesquite is suitable on both soils.

Earthen ponds are better suited for the La Lande soils and the inclusions within the mapping unit that are located in the depressional areas.

12 -- Gypsum land-Holloman like complex, nearly level

This complex consists of well drained, undulating soils on high terraces in the southcentral part of the area at elevations of 4,000 to 4,500 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Gypsum land, 1 to 3 percent slopes makes up about 35 percent of the mapping unit and is on the knolls and ridges. The Holloman like loam, 0 to 2 percent slopes makes up about 25 percent and is on the depressions intermixed with Holloman like thin solum and the included soils. The Holloman like loam thin solum, 0 to 3 percent slopes makes up about 20 percent and is on the knolls and ridges intermixed with the Gypsum land.

Included with this complex in mapping are small areas of Reeves like and Quay like soils and a dark-colored surface soil. These inclusions make up about 20 percent of this unit. The nearly level Reeves like and Quay like soils are on the depressions. The nearly level dark-colored surface soil is in swales with a thick stand of toboso grass, and it receives runon.

The Gypsum land is exposed gypsiferous beds. It consists of thick beds of soft and rock gypsiferous material.

Permeability is variable. The available water capacity is very low. The effective rooting depth is about 0 inches. Surface runoff is medium and the erosion hazard is high from wind and water.

The Holloman like soil is a shallow to gypsiferous beds. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman like soil, the surface layer is brown loam about 3 inches thick. The subsoil is reddish brown and reddish yellow clay loam about 10 inches thick. Below this is pinkish white gypsiferous sandy loam and light reddish brown and gypsiferous sandy clay loam to about 50 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 13 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Holloman like, thin solum soil is very shallow to gypsiferous beds. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman like, thin solum soil, the surface layer is reddish brown loam about 4 inches thick. Below this is pink gypsiferous sandy loam and light reddish brown and red gypsiferous sandy clay loam to about 55 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 5 inches. Surface runoff is medium, and the erosion hazard is high from wind and moderate from water.

This complex is mainly used for range.

The Gypsum land has no potential plant community. The potential plant community of the Holloman like soils consists mainly of tobosa, alkali sacaton, black grama, blue grama, and a variety of perennial and annual forbs. The potential plant community on the Holloman like thin solum consists mainly of gyp grama, gyp dropseed, alkali sacaton, coldenia, black grama, and a variety of perennial forbs.

Grazing management should be designed to increase the vigor and reproduction of blue grama, black grama, and alkali sacaton on the Holloman like soils and to maintain a plant cover on the Holloman like, thin solum soils. As the plant community deteriorates, blue grama and black grama decrease on the Holloman soil. Black grama decreases on the Holloman like, thin solum soil. Plants that occur in a potential community in small amounts, such as tobosa, alkali sacaton, threeawn, and forbs, will increase on the Holloman like soils; and gyp dropseed and coldenia will increase on the Holloman like, thin solum soil. Generally, as the plant community deteriorates, there is a loss of vegetative cover on the Holloman like thin solum soils causing accelerated erosion and exposing the underlying gypsiferous material. Mesquite will easily invade the Holloman like soils where seed source is available.

Range seeding is not suitable due to the very shallow soils and low probability of precipitation. Mechanical brush control of mesquite is limited to the deeper Holloman like soils. Chemical brush control is suitable. Earthen ponds are not suitable due to the shallow depth to gypsiferous materials.

13 -- Bascom-Ratliff association

This association consists of deep, well drained undulating soils on high terraces in the southcentral part of the area at elevations of 3,900 to 4,400 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The bascom gravelly sandy loam, 2 to 7 percent slopes makes up about 55 percent of the mapping unit and is on the ridges. The Ratliff fine sandy loam, 0 to 2 percent slopes makes up about 35 percent and is on the depressions.

Included with this association in mapping are small areas of Blakeney, La Lande, and Redona soils. These inclusions make up about 10 percent of this unit. The moderately undulating Blakeney soils are associated with the Bascom soils on the ridges and side slopes. The nearly level La Lande and Redona soils are associated with the Ratliff soils on the depressions.

The Bascom soil formed in gravelly loamy calcareous alluvium.

In a typical profile of the Bascom soil, the surface layer is light brown gravelly sandy loam about 7 inches thick. The subsoil is pink very gravelly sandy clay loam about 11 inches thick. The substratum is pink very gravelly sandy clay loam and reddish yellow very gravelly loamy coarse sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is medium, and the erosion hazard is high from wind and moderate from water.

The Ratliff soil formed in loamy calcareous alluvium.

In a typical profile of the Ratliff soil, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil is strong brown sandy clay loam about 16 inches thick. The substratum is strong brown and pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

This association is mainly used for range.

The potential native vegetation on the Bascom soils consists mainly of black grama, bush muhly, plains bristlegrass, sideoats grama, common javalinabush, and creosotebush. The potential native vegetation on the Ratliff soils consists mainly of black grama, sand dropseed, blue grama, bush muhly, threeawn, Arizona cottontop, small soapweed, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of black grama, blue grama, sideoats grama, and bush muhly. As the plant community deteriorates on the Bascom soils, burrograss, fluffgrass, sand dropseed, and creosotebush increase. Further deterioration causes a total domination of the plant community by creosotebush, with very little grass production. As the plant community deteriorates on the Ratliff soils, species, such as threeawn, sand dropseed, broom snakeweed, and annual forbs, increase. Mesquite easily invades the Ratliff soils.

Range seeding is not suitable due to the low probability of precipitation. Mechanical brush control of mesquite is limited to the deeper Ratliff soils and is not suitable on the Bascom soils due to the high percentage of gravel throughout the profile. Chemical brush management of creosotebush and mesquite is suitable for both soils.

Earthen ponds are generally not suitable due to the gravel throughout the profile on the Bascom soils and the low runoff of the Ratliff soils. Livestock pipelines and fencing are suitable on both soils; however, it may be difficult to install on the Bascom soils due to the gravel throughout the profile.

15 -- Blakeney-Ratliff association

This association consists of well drained, undulating soils on old alluvial terraces in the southcentral part of the area at elevations of 3,800 to 4,000 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Blakeney fine sandy loam, 0 to 5 percent slopes makes up about 55 percent of the mapping unit and is on the low ridges. The Ratliff fine sandy loam, 0 to 2 percent slopes makes up about 35 percent and is on the depressions.

Included with this association in mapping are small areas of Redona, Sharvana, and Philder soils, and a similar soil to Blakeney except it has indurated caliche deeper than 20 inches. These inclusions make up about 10 percent of this unit. The nearly level Redona soil is on the depressions associated with the Ratliff soil. The nearly level Sharvana soil is on the ridges associated with the Blakeney soil. The undulating to gently rolling Philder soil is on the ridges and breaks associated or intermixed with the Blakeney soil. The nearly level soil similar to Blakeney is on the depressions associated with the Ratliff soil. It is also intermixed with the Blakeney soil.

The Blakeney soil is a shallow soil. It formed in loamy calcareous alluvial and eolian materials.

In a typical profile of the Blakeney soil, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil is brown fine sandy loam about 7 inches thick. The substratum is indurated caliche at a depth of 13 inches.

Permeability is moderately rapid. The available water capacity is very low. The effective rooting depth is about 13 inches. Surface runoff is medium, and the erosion hazard is high from wind and moderate from water.

The Ratliff soil is a deep soil. It formed in loamy calcareous alluvium.

In a typical profile of the Ratliff soil, the surface layer is reddish brown fine sandy loam about 4 inches thick. The subsoil is reddish brown and light reddish brown sandy clay loam about 20 inches thick. The substratum is pink and white sandy loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow and erosion hazard is high from wind and slight from water.

This association is mainly used for range.

The potential native plant community on the Blakeney soil is dominated by black grama with considerable amounts of sideoats grama, plains bristlegrass, and perennial forbs which are desirable forage plants. Scattered plants of common javelinabush, small soapweed, Mormon-tea, and tesajo cactus also occur on this soil. The perennial plant density is about 30 percent.

The potential native plant community on the Ratliff soil consists mainly of blue grama, sideoats grama, black grama, and buffalograss, with considerable amounts of dropseeds. Scattered plants of fourwing saltbush, small soapweed, and Mormon-tea are also present. The perennial plant density is about 15 percent.

Grazing management on these soils should be designed to improve the vigor and reproduction of black grama, sideoats grama, and blue grama and to accumulate litter for soil protection. Systems which alternate or rotate summer and winter rest among pastures and which maintain about 400 to 500 pounds of plant residue to protect the soil surface from blowing will result in a desirable balance of forage grasses and achieve the grazing objective.

As these plant communities deteriorate from continuous selective grazing, the proportions of sideoats grama, black grama, and blue grama decrease and are replaced by less desirable dropseeds, threeawns, yucca, annual grasses, broom snakeweed, and invasions of mesquite and wooly groundsel. This condition is accompanied by a depletion of soil cover and subsequent accelerated erosion.

Range seeding is not practicable on these soils due to low and undependable precipitation. Brush management of mesquite can be accomplished on both components by chemical control. Mechanical control is practicable only on the deeper Ratliff component if surface disturbance can be kept to a minimum. Pipelines, fences, and earthen tanks are more difficult to install on the Blakeney component due to the shallow depth to indurated caliche. However, these are easily installed on the Ratliff soil. The spread of small soapweed (yucca) can be controlled by grazing with cows during the flowering stage in late May and June.

18 -- Quay like-Quay like, thin solum association

This association consists of deep, well drained, undulating soils formed in loamy calcareous alluvium, on alluvial slopes in the north central part of the area at elevations of 3,900 to 4,500 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Quay like loam, 0 to 3 percent slopes makes up about 50 percent of the mapping unit and is on the depressions. The Quay like loam, thin solum, 1 to 3 percent slopes makes up about 30 percent and is on the low ridges.

Included with this association in mapping are small areas of Conger, Bascom, and La Lande soils and a deep, dark-colored soil. These inclusions make up about 20 percent of this unit. The moderately undulating Conger and Bascom soils are on the ridges in association with the Quay like, thin solum soil. The nearly level La Lande soils are on the alluvial slopes in association with the Quay like soil. The nearly level, deep, dark-colored soil is on the floodplain and receives runon. It has a thick stand of tobosa.

In a typical profile of the Quay like soil, the surface layer is brown loam about 6 inches thick. The subsoil is light brown clay loam about 15 inches thick. The substratum is pink clay loam and reddish yellow sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is medium, and the erosion hazard is moderate from wind and water. Depth to maximum accumulation of lime is below 20 inches.

In a typical profile of the Quay like, thin solum soil, the surface layer is light brown loam about 9 inches thick. The subsoil is reddish yellow clay loam about 7 inches thick. The substratum is reddish yellow and light red clay loam to about 50 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 50 inches. Surface runoff is medium, and the erosion hazard is moderate from wind and water. Depth to maximum accumulation of lime is above 20 inches.

This association is mainly used for range.

The potential native vegetation on both soils consists mainly of blue grama, tobosa, sideoats grama, black grama, alkali sacaton, sand dropseed, and a variety of perennial and annual forbs.

The total annual production on the Quay like soils will be two to three times that of the Quay like, thin solum soils due to the additional water received from the runoff of the Quay like, thin solum soils. Grazing management should be designed to increase the vigor and reproduction of black grama, sideoats grama, and blue grama. As the plant community deteriorates, these species will diminish. Plants that occur in the potential plant community in small amounts, such as tobosa, ring muhly, sand dropseed, threeawn, fluffgrass, and broom snakeweed, will increase. Blue grama usually forms a dense, low-growing turf. Cholla cactus and mesquite will easily invade both soils where there is a seed source available.

Range seeding is suitable on both soils. Adapted species suitable for range seeding include improved varieties of blue grama, black grama, and sideoats grama. Chemical brush control of mesquite is suitable by aerial spraying. Mechanical brush control of cholla and mesquite is suitable for both soils. Mechanical treatment such as ripping or pitting is suitable on these soils.

Earthen ponds or pit tanks are better suited to the deep, dark-colored soil on the floodplain.

19 -- Gypsum land-Holloman like complex, rolling

A complete concept of this mapping unit has not been established. Small acreage has been mapped. It consists mainly of Gypsum land and Holloman like soils with 7 to 13 percent slopes along drainageways and on breaks.

A probable range site is a complex of loamy CP-2 and Gyp Upland CP-2.

20 -- Faskin-Roswell complex, hummocky

This complex consists of deep soils on high terraces in the eastern part of the area at elevations of 3,900 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Faskin sandy clay loam, eroded, 0 to 2 percent slopes makes up about 55 percent of the mapping unit and is on the interdune area. The Roswell loamy fine sand, 2 to 25 percent slopes makes up about 40 percent and is on the coppice dunes.

Included with this complex in mapping are small areas of Faskin loamy fine sand and Malstrom, eroded soils. These inclusions make up about 5 percent of this unit. The nearly level Faskin loamy fine sand soils are on the noneroded areas. The nearly level Malstrom eroded soils are on the interdune areas in association with the Faskin soils.

The Faskin soil is a well drained soil. It formed in loamy alluvial and eolian materials.

In a typical profile of the Faskin soil, the surface layer has been removed by soil blowing. The subsoil is reddish brown and yellowish red sandy clay loam about 37 inches thick. The substratum is pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is medium, and the erosion hazard is high from wind and slight from water.

The Roswell soil is an excessively drained soil. It formed in eolian materials.

In a typical profile of the Roswell soil, the surface layer is brown loamy fine sand about 6 inches thick. The substratum is brown loamy fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches. Surface runoff is very slow, and the erosion hazard is very high from wind and slight from water.

This complex is mainly used for range.

The potential native plant community on the Faskin soil consists mainly of little bluestem, sand bluestem, sand dropseed, shinnery oak, sideoats grama, sand sagebrush, New Mexico feathergrass, and a variety of perennial and annual forbs. The potential native plant community on the Roswell soils consists mainly of sand bluestem, little bluestem, sand paspalum, plains bristlegrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs. The present plant community has deteriorated to mesquite, and annual forbs are the dominant vegetation.

Management of these areas should be designed to reduce the competition from the mesquite and allow natural revegetation to take place. Mechanical brush control of mesquite is not suitable on these soils due to the severe wind erosion hazard. Chemical brush control of mesquite is suitable by aerial spraying. The grazing management following brush control should be designed to allow the controlled area to be deferred from grazing during the growing season following brush control. Livestock could then graze for short periods of time before being removed until after the following growing season. This treatment should continue until there is sufficient grass cover to stabilize the dune and interdune area.

Range seeding is not suitable on these soils due to the wind erosion hazard and the low probability of precipitation.

Earthen ponds are generally unsuitable on this unit due to low runoff.

21 -- Roswell-Jalmar complex

This complex consists of deep soils, on high terraces in the eastern part of the area at elevations of 3,900 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Roswell fine sand, 2 to 25 percent slopes makes up about 60 percent of the mapping unit and is on the hummocky and dune areas. The Jalmar fine sand, 0 to 2 percent slopes makes up about 35 percent and is on the depressions and interdune areas.

Included with this complex in mapping are small areas of Malstrom, Faskin, and Pyote soils. These inclusions make up about 5 percent of this unit. These nearly level soils are scattered and are on depressions in association with the Jalmar soils.

The Roswell soil is an excessively drained soil. It formed in eolian materials.

In a typical profile of the Roswell soil, the surface layer is yellowish brown and light yellowish brown fine sand about 15 inches thick. The substratum is light yellowish brown fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches. Surface runoff is very slow, and the erosion hazard is very high from wind and slight from water.

The Jalmar soil is a well drained soil. It formed in sandy alluvial and eolian materials.

In a typical profile of the Jalmar soil, the surface layer is brown, light brown, and reddish yellow fine sand about 22 inches thick. The subsurface is reddish yellow fine sand about 12 inches thick. The subsoil is reddish yellow sandy clay loam and fine sandy loam to about 60 inches.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This complex is mainly used for range.

The potential native plant community consists mainly of sand bluestem, little bluestem, sand paspalum, plains bristlegrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of sand bluestem and little bluestem. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as threeawn, field sandbur, small soapweed, sand sagebrush, and shinnery oak, will increase. Mesquite will easily invade the Jalmar soils. As the plant community deteriorates and shinnery oak predominates, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage of growth. At this period of time, the shinnery oak is toxic to livestock. Generally, as the plant community deteriorates, it is accompanied by loss of plant cover and little causing a wind erosion hazard.

The potential native plant community consists mainly of sand bluestem, little bluestem, sand paspalum, plains bristlegrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of sand bluestem and little bluestem. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as threeawn, field sandbur, small soapweed, sand sagebrush, and shinnery oak, will increase. Mesquite will easily invade the Jalmar soils. As the plant community deteriorates and shinnery oak predominates, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage of growth. At this period of time, the shinnery oak is toxic to livestock. Generally, as the plant community deteriorates, it is accompanied by loss of plant cover and litter causing a wind erosion hazard.

Range seeding is not suitable due to the soil blowing hazard. Chemical brush control of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying. Earthen ponds are generally unsuitable on this unit due to low runoff and rapidly permeable soils. Livestock watering facilities should be located on the loamy-textured soils that are included in the complex. Mechanical treatment is not suitable due to the wind erosion hazard.

22 -- Faskin fine sand, 0 to 2 percent slopes

This deep, well drained, nearly level soil is in the eastern part of the area. It formed in loamy alluvial and eolian materials on high terraces at elevations of 4,000 to 4,200 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. It makes up about 85 percent of the mapping unit.

In a typical profile of the Faskin soil, the surface layer is yellowish brown fine sand about 14 inches thick. The subsoil is brown, light reddish brown, and pink sandy clay loam about 42 inches thick. The substratum is pinkish white loam to a depth of about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

Small areas of Jalmar and Roswell soils and a moderately deep soil to indurated caliche were included in mapping. The nearly level Jalmar soils are intermixed with the Faskin soil. The moderately undulating Roswell soils are on the scattered dunes. The moderately deep soil to indurated caliche occurs in some of the areas of this mapping unit. These inclusions make up about 15 percent of the unit.

This soil is used mainly for range.

The potential native plant community consists mainly of little bluestem, sand bluestem, sand dropseed, shinnery oak, New Mexico feathergrass, sand sagebrush, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of species such as little bluestem, sand bluestem, and New Mexico feathergrass. Deferment from grazing during April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as shinnery oak, sand sagebrush, threeawn, mesa and sand dropseed, and forbs, will increase. Mesquite will easiliy invade this unit. Where the plant community has deteriorated to where shinnery oak dominates, cattle should be removed from this unit when the Shinnery oak is in the late bud and early leaf stage due to its toxicity to livestock during this period. As the plant community deteriorates, it is usually accompanied by loss of plant cover causing wind erosion hazard.

Range seeding is suitable on this soil. Adapted species suitable for range seeding include improved varieties of little bluestem, sand bluestem, and sideoats grama. Mechanical brush control and mechanical treatment are not suitable due to the wind erosion hazard. Chemical brush control of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying.

Earthen ponds are generally unsuitable on this unit due to low runoff.

23 -- Jal like-Malstrom association

This association consists of deep, well drained, undulating soils on swales on high terraces in the eastern part of the area at elevations of 3,800 to 4,000 feet. The mean annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Jal like fine sandy loam, 0 to 2 percent slopes makes up about 45 percent of the mapping unit and is on the lower part. The Malstrom loamy fine sand, 0 to 4 percent slopes makes up about 40 percent of the mapping unit and is on the upper part. Commonly, the landscape position does not reveal where the Jal like and Malstrom soils occur.

Included with this association in mapping are small areas of Jalmar, Roswell, Pyote, and Faskin soils, and a clayey soil. These inclusions make up about 15 percent of this unit. The nearly level clayey soil is on the floodplains. The nearly level Faskin, Jalmar, and Pyote soils are on the outer edges of the mapping unit. The moderately rolling Roswell soils are on the outer edges.

The Jal like soil formed in alluvial and lacustrine materials.

In a typical profile of the Jal like soil, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is reddish brown sandy clay loam about 10 inches thick. The substratum is light brown, light brownish gray, and very pale brown clay loam and very pale brown loam to about 60 inches thick.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 20 inches to high lime. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Malstrom soil formed in loamy calcareous alluvial and eolian materials.

In a typical profile of the Malstrom soil, the surface layer is brown loamy fine sand about 4 inches thick. The subsoil is brown loamy fine sand about 10 inches thick. The substratum is light brown and pink fine sandy loam and pink loam to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is 20 to 30 inches to high lime. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The Jal like soils have a potential native vegetation that consists mainly of black grama, blue grama, sideoats grama, vine-mesquite, tobosa, and a variety of forbs and small soapweed.

The Malstrom soils have a potential native vegetation that consists mainly of black grama, little bluestem, sideoats grama, blue grama, sand dropseed, plains bristlegrass, small soapweed, and a variety of forbs.

Grazing management should be designed to increase the vigor and reproduction of black grama, sideoats grama, little bluestem, and blue grama. As the potential plant community deteriorates, the more desirable plants will decrease and will be replaced by burrograss, fluffgrass, ring muhly, and broom snakeweed on the Jal like soils. On the Malstrom soils the plant community will deteriorate to threeawns, sand dropseed, and broom snakeweed. Mesquite and shinnery oak will easily invade the Malstrom soils.

Range seeding is limited on both soils due to the low probability of precipitation and the wind erosion hazard on the Malstrom soils. Adapted species suitable for range seeding include improved varieties of black grama, little bluestem, sideoats grama, and blue grama on both soils. Fourwing saltbush should be included on the Jal like soils. Chemical brush control of mesquite and shinnery oak is suitable. Mechanical treatment is limited due to the wind erosion hazard.

Earthen ponds are generally unsuitable on the Malstrom soils due to the low runoff. Livestock watering facilities should be located on the clayey-textured soil inclusions occurring in the bottom of the drainageways.

24 -- Jalmar-Roswell association

This association consists of deep soils on high terraces in the eastern part of the area at elevations of 3,900 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 10° F. The average growing season is about 200 days. The Jalmar fine sand, 0 to 2 percent slopes makes up about 50 percent of the mapping unit and is on the plain areas. The Roswell fine sand, 2 to 15 percent slopes makes up about 20 percent and is on the dunes. The Pyote fine sand, 2 to 5 percent slopes makes up about 20 percent and is on the hummocks.

Included with this association in mapping are small areas of Faskin, Malstrom, and Malstrom like soils. These inclusions make up about 10 percent of this unit. These nearly level soils are on the plain areas in association with the Jalmar soil.

The Jalmar soil is a well drained soil. It formed in sandy alluvial and eolian materials.

In a typical profile of the Jalmar soil, the surface layer is brown, reddish yellow fine sand and yellowish red loamy fine sand about 24 inches thick. The subsoil is light reddish brown and reddish brown sandy clay loam about 33 inches thick. The substratum is white clay loam to about 60 inches.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Roswell soil is an excessively drained soil. It formed in eolian material.

In a typical profile of the Roswell soil, the surface layer is light brown fine sand about 13 inches thick. The substratum is pink fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches. Surface runoff is very slow, and the erosion hazard is very high from wind and slight from water.

The Pyote soil is a well drained soil. It formed in sandy alluvial and eolian materials.

In a typical profile of the Pyote soil, the surface layer is strong brown fine sand about 20 inches thick. The subsoil is reddish yellow loamy fine sand and yellowish red fine sandy loam about 15 inches thick. The substratum is reddish yellow loamy fine sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The potential native plant community consists mainly of sand bluestem, little bluestem, sand paspalum, plains bristlegrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of sand bluestem and little bluestem. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as threeawn, field sandbur, small soapweed, sand sagebrush, and shinnery oak, will increase. Mesquite will easily invade the Jalmar soils. As the plant community deteriorates and shinnery oak predominates, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage of growth. At this period of time the shinnery oak is toxic to livestock. Generally, as the plant community deteriorates, it is accompanied by loss of plant cover and litter causing a wind erosion hazard.

Range seeding is not suitable due to the soil blowing hazard. Chemical brush control of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying.

Earthen ponds are generally unsuitable on this unit due to low runoff and rapidly permeable soils. Livestock watering facilities should be located on the loamy-textured soils that are included in the complex. Mechanical treatment is not suitable due to the wind erosion hazard.

25 -- Faskin-Malstrom association

This association consists of deep, well drained, level soils on high terraces in the eastern part of the area at elevations of 3,900 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Faskin loamy fine sand, 0 to 2 percent slopes makes up about 50 percent of the mapping unit, and the surface features generally do not reveal where the Faskin or the Malstrom soils occur. The Malstrom loamy fine sand, 0 to 2 percent slopes makes up about 40 percent.

Included with this association in mapping are small areas of Jalmar, Pyote, Roswell, and Malstrom soils. These inclusions make up about 10 percent of this unit. The Jalmar and Pyote soils are on areas of thick, fine sand and loamy fine sand surface layers. The Roswell soil is on the dune areas. The nearly level Malstrom like soil is intermixed with the Faskin and Malstrom soils.

The Faskin soil formed in loamy alluvial and eolian materials.

In a typical profile of the Faskin soil, the surface layer is brown loamy fine sand about 9 inches thick. The subsoil is red fine sandy loam and sandy clay loam about 41 inches thick. The substratum is pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Malstrom soil formed in loamy calcareous alluvial and eolian materials.

In a typical profile of the Malstrom soil, the surface layer is brown loamy fine sand about 8 inches thick. The subsoil is brown loamy fine sand about 16 inches thick. The substratum is light yellowish brown and very pale brown fine sandy loam to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 24 inches to high lime. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The potential native plant community of the Faskin and Malstrom soils consists mainly of little bluestem, sand bluestem, sideoats grama, sand dropseed, New Mexico feathergrass, shinnery oak, sand sagebrush, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of species such as little bluestem, sideoats grama, sand bluestem, and New Mexico feathergrass. As the plant community deteriorates, these species will increase. Plants that occur in the plant community in smaller amounts, such as threeawns, mesa and sand dropseed, sand sagebrush, shinnery oak, and forbs, will increase as the plant community deteriorates. Mesquite will easily invade both soils. Where shinnery oak dominates the plant community, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage due to its toxicity to livestock during this period of growth. As the plant community deteriorates, it is usually accompanied by loss of plant cover causing wind erosion hazard.

Range seeding is suitable on both soils. However, it is limited due to the low probability of precipitation and the wind erosion hazard. Adopted species suitable for seeding include improved varieties of little bluestem, sand bluestem, and sideoats grama. Chemical brush management of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying. Mechanical treatment, such as mechanical brush management, pitting, or furrowing, are not suitable due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to the low runoff.

26 -- Pyote-Faskin association

This association consists of deep, well drained, undulating soils on high terraces in the eastern part of the area at elevations of 3,900 to 4,200 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Pyote loamy fine sand, 0 to 5 percent slopes makes up about 55 percent of the mapping unit and is on the ridges. The Faskin loamy fine sand, 0 to 2 percent slopes makes up about 35 percent and is on the depressions.

Included with this association in mapping are small areas of Malstrom and Jalmar soils. These inclusions make up about 10 percent of this unit. The nearly level Malstrom and Jalmar soils are on the depressions in association with the Faskin soils.

The Pyote soil formed in sandy alluvial and eolian materials.

In a typical profile of the Pyote soil, the surface layer is brown and yellowish red loamy fine sand about 19 inches thick. The subsoil is reddish brown fine sandy loam about 31 inches thick. The substratum is light reddish brown loamy fine sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Faskin soil formed in loamy alluvial and eolian materials.

In a typical profile of the Faskin soil, the surface layer is brown and light brown loamy fine sand about 16 inches thick. The subsoil is yellowish red and pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The potential native vegetation consists mainly of little bluestem, sand bluestem, sand dropseed, New Mexico feathergrass, black grama, sideoats grama, shinnery oak, small soapweed, sand sagebrush, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of little bluestem, sand bluestem, New Mexico feathergrass, black grama, and sideoats grama. As the plant community deteriorates, these species will diminish. Plants that occur in the potential plant community in small amounts, such as threeawn, field sandbur, shinnery oak, sand sagebrush, broom snakeweed, and small soapweed, will increase. Mesquite will easily invade these soils. Deferred grazing is beneficial to New Mexico feathergrass during April, May, and June. Deferment during this period allows the plant to regain vigor and to reproduce. As the plant community deteriorates and shinnery oak predominates, cattle should be removed from this unit when the shinnery oak is in late bud or early leaf stage of growth. At this time, the shinnery oak is toxic to the livestock. Generally, as the plant community deteriorates, it is accompanied by loss of plant cover and litter, causing a wind erosion hazard.

Range seeding is not suitable on this unit due to the wind erosion hazard. Mechanical treatment or mechanical brush control is not suitable on this unit due to the wind erosion hazard. Chemical brush control of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying.

Earthen ponds are generally unsuitable on this unit due to the low runoff and rapid permeability of the soils.

27 -- Redona-Canez association

This association consists of deep, well drained soils on high terraces in the south central part of the area at elevations of 4,000 to 4,300 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Redona fine sandy loam, 0 to 2 percent slopes makes up about 60 percent of the mapping unit and is on the low ridges. The Canez fine sandy loam, 0 to 1 percent slopes makes up about 35 percent and is on the depressions. The surface features commonly do not reveal where the Redona or Canez soils occur.

Included with this association in mapping are small areas of Ratliff and Blakeney soils. These inclusions make up about 5 percent of this unit. The nearly level Ratliff soils are on the low ridges in association with the Redona soil. The moderately undulating Blakeney soils are on the low indurated caliche ridges.

The Redona soil formed in loamy calcareous alluvium.

In a typical profile of the Redona soil, the surface layer is reddish brown fine sandy loam about 10 inches thick. The subsoil is reddish brown and light reddish brown sandy clay loam about 40 inches thick. The substratum is pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Canez soil formed in loamy alluvium.

In a typical profile of the Canez soil, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is yellowish red and red sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on these soils consists mainly of blue grama, black grama, sideoats grama, little bluestem, plains bristlegrass, small soapweed, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of sideoats grama, black grama, little bluestem, and plains bristlegrass. As the plant community deteriorates, most of these species diminish. Plants that occur in the potential plant community in small amounts, such as sand dropseed, threeawn, ring muhly, blue grama, small soapweed, broom snakeweed, and sand sage, will increase. Under these conditions blue grama usually forms a dense, low growing turf and is low in productivity. Mesquite and catclaw easily invade both soils.

Range seeding is suitable on both boils but is limited due to the low probability of precipitation. Adapted species suitable for range seeding include improved varieties of sideoats grama, little bluestem, black grama, plains bristlegrass, and blue grama. Chemical brush control of mesquite and catclaw is suitable by aerial spraying. Mechnical treatment such as pitting or ripping is suitable on both soils but is limited due to the low probability of precipitation.

28 -- Roswell fine sand, 10 to 30 percent slopes

This deep, excessively drained, rolling to steep soil is in the eastern part of the area. It formed in eolian material on high terraces at elevations of 4,000 to 4,200 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 10° F. The average growing season is about 200 days. It makes up about 90 percent of the mapping unit.

In a typical profile of the Roswell soil, the surface layer is pale brown and light yellowish brown fine sand about 19 inches thick. The substratum is light brown fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches or more. Surface runoff is very slow, and the erosion hazard is very high from wind and slight from water.

Small areas of nearly level Jalmar, Pyote, and Roswell soils were included in mapping. They occupy the small depressions between the Roswell soils and make up about 10 percent of the unit.

This soil is used mainly for range.

The potential native vegetation consists mainly of sand bluestem, little bluestem, sideoats grama, shinnery oak, dropseeds, Indian ricegrass, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of species such as sand bluestem, little bluestem, and sideoats grama. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as shinnery oak, threeawns, field sandbur, sand sagebrush, and forbs, will increase. Shinnery oak will eventually dominate the site. Where shinnery oak dominates, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage due to its toxicity to livestock during this period. As the plant community deteriorates, it is usually accompanied by a loss of plant cover causing severe wind erosion hazard and could reactivate recently stabilized sand dunes.

Range seeding on this soil is generally not suitable due to the low probability of precipitation and severe wind erosion hazard. Chemeical brush control of shinnery oak and sand sagebrush is suitable by aerial spraying. Mechanical brush control and mechanical treatment is not suitable due to the wind erosion hazard.

Earthen ponds are not suitable on this unit due to seepage and low runoff. Livestock watering facilities should be located on the loamy-textured soil inclusions in the mapping unit to avoid soil blowing from the sacrifice areas.

29 -- Torriorthents, steep

A complete concept of this mapping unit has not been established. Small acreage has been mapped. It consists of the High Plains escarpment and breaks.

This range site would be Breaks HP-3.

31 --

This mapping unit has not been named or described due to small acreage. The soils consist mainly of moderately deep or deep soils with fine sandy loam surface layers. Slopes are 0 to 7 percent. Some areas consist of deep clayey soils.

A probably range site is Sandy CP-2.

33 -- Malstrom like-Pyote complex

This complex consists of deep, well drained, level soils on high terraces in the eastern part of the area at elevations of 4,000 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Malstrom like fine sand, 0 to 2 percent slopes makes up about 50 percent of the mapping unit and is on the low ridges. The Pyote fine sand, 0 to 1 percent slopes makes up about 40 percent and is on the depressions and may occur on the low ridges.

Included with this complex in mapping are small areas of Jalmar, Malstrom, and Roswell soils. These inclusions make up about 10 percent of this unit. The nearly level Jalmar soils are intermixed with the Pyote soils on the depressions and smooth areas. The gently undulating Malstrom soils are intermixed with the Malstrom like soils on the low ridges. The moderately undulating Roswell soils are on the scattered dunes.

The Malstrom like soil formed in sandy calcareous alluvial and eolian materials.

In a typical profile of the Malstrom like soil, the surface layer is brown and yellowish brown fine sand about 17 inches thick. The subsoil is light yellowish brown loamy fine sand about 7 inches thick. The substratum is very pale brown loam, loamy fine sand, and white fine sandy loam to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth to high lime content is 20 to 30 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Pyote soil formed in sandy alluvial and eolian materials.

In a typical profile of the Pyote soil, the surface layer is yellowish brown fine sand about 14 inches thick. The upper part of the subsoil is light yellowish brown loamy fine sand about 13 inches thick. The lower part of the subsoil is light yellowish brown fine sandy loam about 8 inches thick. The substratum is very pale brown loamy fine sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This complex is used mainly for range.

The potential native plant community of these soils consists mainly of little bluestem, sideoats grama, sand dropseed, sand bluestem, New Mexico feathergrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of species such as little bluestem, sideoats grama, sand bluestem, and New Mexico feathergrass. Deferment from grazing during April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as threeawns, mesa and sand dropseeds, sand sagebrush, shinnery oak, and forbs, will increase as the plant community deteriorates. Mesquite will easily invade both soils. Where shinnery oak dominates the plant community, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage due to its toxicity to livestock during this period of growth. As the plant community deteriorates, it is usually accompanied by loss of plant cover causing wind erosion hazard.

Range seeding is suitable on both soils. However, it is limited due to the low probabilitiy of precipitation and the wind erosion hazard. Adapted species suitable for seeding include improved varieties of little bluestem, sand bluestem, and sideoats grama. Chemical brush management of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying. Mechanical treatment such as mecahnical brush management, pitting, or furrowing are not suitable due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to the low runoff.

34 -- Malstrom like-Faskin complex

This complex consists of deep, well drained, level soils on high terraces in the eastern part of the area at elevations of 4,000 to 4,100 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Malstom like fine sand, 0 to 2 percent slopes makes up about 50 percent of the mapping unit. The Faskin fine sand, 0 to 2 percent slopes makes up about 30 percent. The surface features generally do not reveal where the Malstrom like and Faskin soils occur. The Malstrom fine sand, 0 to 2 percent slopes makes up about 15 percent and is on the low ridges.

Included with this complex in mapping are small areas of Jalmar, Pyote, and Roswell soils. These inclusions make up about 5 percent of this unit. The nearly level Jalmar and Pyote soils are intermixed with the Faskin soils. The moderately undulating to moderately rolling Roswell soils are on the dune areas.

The Malstrom like soil formed in sandy calcareous alluvial and eolian materials.

In a typical profile of the Malstrom like soil, the surface layer is brown fine sand about 13 inches thick. The subsoil is brown loamy fine sand and fine sandy loam about 12 inches thick. The substratum is pinkish white and white loam to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 25 inches to the high lime layer. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Faskin soil formed in loamy alluvial and eolian materials.

In a typical profile of the Faskin soil, the surface layer is brown and yellowish brown fine sand about 15 inches thick. The subsoil is reddish brown fine sandy loam and yellowish red sandy clay loam about 30 inches thick. The substratum is white loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

The Malstrom soil formed in loamy calcareous alluvial and eolian materials.

In a typical profile of the Malstrom soil, the surface layer is brown fine sand about 9 inches thick. The subsoil is pale brown loamy fine sand about 13 inches thick. The substratum is very pale brown fine sandy loam and loam to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 22 inches to the high lime layer. Surface runoff is slow, and the erosion hazard is very high from wind and slight from water.

This complex is used mainly for range.

The potential native plant community of these soils consists mainly of little bluestem, sideoats grama, sand dropseed, sand bluestem, New Mexico feathergrass, sand sagebrush, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor and reproduction of species such as little bluestem, sideoats grama, sand bluestem, and New Mexico feathergrass. Deferment from grazing during April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as threeawns, mesa and sand dropseeds, sand sagebrush, shinnery oak, and forbs, will increase as the plant community deteriorates. Mesquite will easily invade both soils. Where shinnery oak dominates the plant community, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage due to its toxicity to livestock during this period of growth. As the plant community deteriorates, it is usually accompanied by loss of plant cover causing wind erosion hazard.

Range seeding is suitable on both soils. However, it is limited due to the low probability of precipitation and the wind erosion hazard. Adapted species suitable for seeding include improved varieties of little bluestem, sand bluestem, and sideoats grama. Chemical brush management of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying. Mechanical treatment such as mechanical brush management, pitting, or furrowing are not suitable due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to the low runoff.

35 -- Holloman-Gypsum land complex

This complex consists of well drained, level soils on high terraces in the south central part of the area at elevations of 3,600 to 3,800 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Holloman loam, 0 to 2 percent slopes makes up about 40 percent of the mapping unit and is on the depressions. The Gypsum land, 0 to 2 percent slopes makes up about 25 percent and is on the low knolls. The Holloman loam, thin solum, 0 to 2 percent slopes makes up about 20 percent and is on the low knolls intermixed with the Gypsum land.

Included with this complex in mapping are small areas of Reeves soils, a deep, dark surface colored soil, and a soil similar to the Reeves soils except it has more clay in the subsoil. These inclusions make up about 15 percent of this unit. These level soils are on the depressions in association with the Holloman soils. The deep, dark surface colored soil and the soil similar to the Reeves soils receive runon from the surrounding area and have thick stands of tobosa.

The Holloman soil is a shallow soil. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman soil, the surface layer is brown and pale brown loam about 7 inches thick. The substratum is brown loam to about 15 inches. Below this, to a depth of 60 inches, is very pale brown and reddish yellow gypsiferous loamy sand.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 15 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Gypsum land is exposed gypsiferous beds. It consists of thick beds of soft and rock gypsiferous material.

Permeability is variable. The available water capacity is very low. The effective rooting depth is about 0 inches. Surface runoff is medium, and the eroison hazard is high from wind and water.

The Holloman, thin solum soil is a very shallow soil. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman, thin solum soil, the surface layer is pale brown loam about 4 inches thick. Below this, to a depth of 60 inches, is white gypsiferous loamy sandy and very pale brown, pale brown, and light gray gypsiferous sand.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 4 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

This complex is used mainly for range.

The potential native plant communities on this complex consist mainly of gyp grama, alkali sacaton, tobosa, gyp dropseed, and black grama in sparse stands. Scattered plants of Mormon-tea, fourwing saltbush, and soaptree yucca are also present. The overall perennial plant density on the complex is less than 10 percent.

Grazing management on this complex should be designed to increase total vegetative cover and accumulate plant litter for soil protection. The total forage yield on this complex during normal years is insufficient and too undependable on which to base a perennial livestock grazing program. Total vegetative yield is barely adequate during normal years to provide soil surface protection. Therefore, the best grazing management strategy would be to graze this complex only for short periods with held-over calves during the fall following above-normal growing seasons.

As the plant communities on this complex deteriorate from continuous selective grazing, the proportion of gyp grama, black grama, and alkali sacaton decreases and the proportion of less desirable threeawns, dropseeds, burrograss, fluffgrass, creosotebush, coldenia, and cacti increases. This condition is accompanied by a further depletion of soil cover and soil surface loss due to wind erosion resulting in a shift in mapping unit composition from Holloman loam to Holloman loam, thin solum and from Holloman loam, thin solum to Gypsum land.

Range seeding is not practicable on this complex due to undependable precipitation and shallow soils. The economics of livestock grazing on this complex do not justify expenditures for brush control or construction type range improvement practices.

36 -- Reeves-Holloman, thin solum complex

This complex consists of well drained, undulating soils on high terraces in the south central part of the area at elevations of 3,600 to 3,800 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Reeves loam, 0 to 2 percent slopes makes up about 45 percent of the mapping unit and is on the depressions. The Holloman loam, thin solum, 0 to 3 percent slopes makes up about 25 percent and is on the low knolls. The Gypsum land, 0 to 3 percent slopes makes up about 20 percent and is on the low knolls intermixed with the Holloman, thin solum soil.

Included with this complex in mapping are small areas of Holloman soils, a deep, dark surface colored soil, and a soil similar to the Reeves soil except it has more clay in the subsoil. These inclusions make up about 10 percent of this unit. These nearly level soils are on the depressions and are intermixed with Reeves soils. The deep, dark surface colored soil and the soil similar to the Reeves soil receive runon from the surrounding area and have thick stands of tobosa.

The Reeves soil is moderately deep. It formed in loamy calcareous alluvium high in gypsum.

In a typical profile of the Reeves soil, the surface layer is light brown and brown loam about 8 inches thick. The subsoil is yellowish red loam about 6 inches thick. The substratum is reddish yellow clay loam to about 24 inches. Below this, to a depth of 60 inches, is reddish yellow sandy loam and yellowish red loam.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 24 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Holloman, thin solum soil is a very shallow soil. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman, thin solum soil, the surface layer is light brown loam about 5 inches thick. Below this, to a depth of 40 inches, is very pale brown and pale yellow gypsiferous sandy loam.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 5 inches. Surface runoff is slow to medium, and the erosion hazard is high from wind and slight from water.

The Gypsum land is exposed gypsiferous beds. It consists of thick beds of soft and rock gypsiferous material.

Permeability is variable. The available water capacity is very low. The effective rooting depth is about 0 inches. Surface runoff is medium, and the erosion hazard is high from wind and water.

This complex is used mainly for range.

The potential native plant communities on this complex consist mainly of tobosa, burrograss, blue grama, black grama, alkali sacaton, and vine-mesquite. Scattered plants of fourwing saltbush, Mormon-tea, small soapweed, and winterfat are also present. The overall perennial plant density on the complex is about 20 percent.

Grazing management on this complex should be designed to concentrate intensive short-term grazing on the dominant tobosa and burrograss during the summer rainy season and capitalize on the lush green growth period resulting from rainfall and runon. Systems which incorporate winter rest from grazing will also improve the vigor, abundance, and reproduction of black grama, winterfat, and fourwing saltbush which are desirable forage producing plants.

As the plant communities on this complex deteriorate through continuous selective grazing, the desirable black grama, alkali sacaton, and vine-mesquite decrease and are replaced by increases in burrograss, threeawns, broom snakeweed, small soapweed, and invasions of mesquite which lower forage quality and grazing value.

Mesquite invasions can be managed effectively by chemical control during favorable moisture years. Mechanical control is not recommended due to the soil surface disturbance involved and the difficulty in establishing a desirable replacement vegetation. Range seeding is not practicable on this complex due to low and undependable precipitation.

Earthen structures are not recommended because of the highly soluble gypsum substrata.

37 -- Holloman-Gypsum land complex, steep

A complete concept of this mapping unit has not been established. It consists mainly of Holloman, thin solum and Holloman soils and Gypsum land. It occurs along terrace breaks and drainageways. Slopes are 13 to 55 percent.

A probable range site is Gyp Hills SD-3.

38 -- Ratliff-Blakeney association

This association consists of well drained, undulating soils on high terraces in the south central part of the area at elevations of 3,800 to 4,000 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Ratliff fine sandy loam, 0 to 2 percent slopes makes up about 60 percent of the mapping unit and is on the alluvial slopes and depressions. The Blakeney fine sandy loam, 2 to 5 percent slopes makes up about 35 percent and is on the low ridges.

Included with this association in mapping are small areas of Redona and Philder soils and a soil that is moderately deep to indurated caliche. These inclusions make up about 5 percent of this unit. The nearly level Redona soils are on the depressions in association with the Ratliff soils. The undulating Philder soils are on the shoulders of the ridges in association with the Blakeney soils. The nearly level, moderately deep soil is on the low ridges in association with the Blakeney soils.

The Ratliff soil is a deep soil. It formed in loamy calcareous alluvium.

In a typical profile of the Ratliff soil, the surface layer is reddish brown fine sandy loam about 6 inches thick. The subsoil is reddish brown and light reddish brown sandy clay loam about 30 inches thick. The substratum is white and reddish yellow fine sandy loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Blakeney soil is a shallow soil. It formed in loamy calcareous alluvial and eolian materials.

In a typical profile of the Blakeney soil, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is fine sandy loam about 11 inches thick. The substratum is indurated caliche at a depth of 15 inches.

Permeability is moderately rapid to the indurated caliche. The available water capacity is very low. The effective rooting depth is about 15 inches. Surface runoff is medium, and the erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on the Ratliff soil consists mainly of blue grama, sideoats grama, black grama, and buffalograss, and considerable amounts of dropseeds. Scattered plants of fourwing saltbush, small soapweed, and Mormon-tea are also present. The perennial plant density is about 15 percent.

The potential native plant community on the Blakeney soil is dominated by black grama with considerable amounts of sideoats grama, plains bristlegrass, and perennial forbs which are desirable forage plants. Scattered plants of common javalinabush, small soapweed, Mormon-tea, and tesajo cactus also occur on this soil. The perennial plant density is about 30 percent.

Grazing management on these soils should be designed to improve the vigor and reproduction of black grama, sideoats grama, and blue grama and to accumulate litter for soil protection. Systems which alternate or rotate summer and winter rest among pastures and which maintain about 400 to 500 pounds of plant residue to protect the soil surface from blowing will result in a desirable balance of forage grasses and achieve the grazing objective.

As these plant communities deteriorate from continuous selective grazing, the proportion of sideoats grama, black grama, and blue grama decreases and are replaced by less desirable dropseeds, threeawns, yucca, annual grasses, broom snakeweed, and invasions of mesquite and wooly groundsel. This condition is accompanied by a depletion of soil cover and subsequent accelerated erosion.

Range seeding is not practicable on these soils due to low and undependable precipitation. Brush management of mesquite can be accomplished on both components by chemical control. Mechanical brush control is practicable only on the deeper Ratliff component if surface disturbance can be kept to a minimum. Pipelines, fences, and earthen tanks are easily installed on the Ratliff soil but are more difficult to install on the Blakeney soil due to the shallow depth to indurated caliche. The spread of small soapweed yucca can be controlled by grazing with cows during the flowering stage in late May and June.

39 -- Sharvana fine sandy loam, 0 to 2 percent slopes

This shallow, well drained, nearly level soil is in the eastern part of the area. It formed in loamy calcareous alluvium on high terraces at elevations of 3,500 to 4,000 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. It makes up about 90 percent of the mapping unit.

In a typical profile of the Sharvana soil, the surface layer is reddish brown fine sandy loam about 3 inches thick. The subsoil is reddish brown sandy clay loam about 11 inches thick. The substratum is indurated caliche at a depth of 14 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 14 inches. Surface runoff is medium, and the erosion hazard is high from wind and slight from water.

Small areas of Faskin, Ratliff, Blakeney, and Redona soils were included in mapping. These nearly level soils are scattered throughout this unit. These inclusions make up about 10 percent of the unit.

This soil is used mainly for range.

The potential native vegetation consists mainly of blue grama, black grama, sideoats grama, hairy grama, little bluestem, New Mexico feathergrass, small soapweed, perennial and annual forbs, and winterfat.

Grazing management should be designed to increase the production, vigor and reproduction of species such as black grama, sideoats grama, little bluestem, and New Mexico feathergrass. Deferment from grazing is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass during April, May, and June. As the plant community deteriorates, black grama, sideoats grama, little bluestem, and New Mexico feathergrass decrease. Plants that occur in the potential plant community in smaller amounts such as blue grama, sand dropseed, threeawn, small soapweed, and broom snakeweed will increase. Mesquite and catclaw easily invade the plant community under these conditions. Blue grama usually forms a low, dense turf and is low in productivity.

Range seeding for mechanical treatments is not suitable in this soil due to the shallow depth to indurated caliche. Chemical brush control of mesquite and catclaw is suitable by aerial spraying. This soil is not suitable for earthen ponds. It is difficult to install livestock pipelines and fences on this unit due to the shallow depth to indurated caliche.

42 -- Ratliff-Portales association

This association consists of deep, well drained, level soils formed in loamy calcareous alluvium below the High Plains breaks on alluvial slopes in the eastern part of the area at elevations of 4,100 to 4,300 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Ratliff fine sandy loam, 0 to 2 percent slopes makes up about 60 percent of the mapping unit and is on the low ridges. The Portales loam, 0 to 2 percent slopes makes up about 30 percent and is on the depressions.

Included with this association in mapping are small areas of a gravelly soil and a deep, dark-colored soil. These inclusions make up about 10 percent of this unit. The undulating gravelly soil is on the ridges and short slopes. Sideoats grama is common on this soil. The nearly level, deep, dark-colored soil is on the floodplain and receives runon. It has a thick stand of tobosa and is suited for pit tanks.

In a typical profile of the Ratliff soil, the surface layer is brown and light brown fine sandy loam about 11 inches thick. The subsoil is pink sandy clay loam about 15 inches thick. The substratum is pink clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is medium, and the erosion hazard is high from wind and slight from water.

In a typical profile of the Portales soil, the surface layer is brown loam about 10 inches thick. The subsoil is brown loam and light brown clay loam about 23 inches thick. The substratum is pink clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on the Ratliff soils consists mainly of blue grama, sideoats grama, little bluestem, black grama, plains bristlegrass, small soapweed, and a variety of perennial and annual forbs. The potential native plant community on the Portales soils consists mainly of blue grama, tobosa, sideoats grama, black grama, vine-mesquite, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of sideoats grama, little bluestem, black grama, and plains bristlegrass on the Ratliff soils. On the Portales soils grazing management should be designed to increase sideoats grama, black grama, and vine-mesquite. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in smaller amounts, such as blue grama, sand dropseed, threeawn, ring muhly, and broom snakeweed, will increase on the Ratliff soils. Blue grama, tobosa, threeawn, ring muhly, and broom snakeweed will increase on the Portales soils. Blue grama, under these conditions, usually forms a dense, low growing form and is low in productivity. Mesquite will easily invade both soils where there is an available seed source.

Range seeding is suitable on both soils. However, it is limited due to the low probability of precipitation. Adapted species suitable for seeding include improved varieties of sideoats grama, black grama, and blue grama on both soils. Little bluestem should be included in the seeding of the Ratliff soils.

43 -- Ratliff-Redona association

This association consists of deep, well drained, level soils formed in loamy calcareous aluvium on high terraces in the eastern part of the area at elevations of 4,000 to 4,300 feet. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Ratliff fine sandy loam, 0 to 2 percent slopes makes up about 55 percent of the mapping unit and is on alluvial slopes and low ridges. The Redona fine sandy loam, 0 to 1 percent slopes makes up about 40 percent and is on the depressions.

Included with this association in mapping are small areas of Blakeney and Canez soils. These inclusions make up about 5 percent of this unit. The gently sloping Blakeney soils are on the low, indurated caliche ridges in association with the Ratliff soils. The nearly level Canez soils are on the depressions in association with the Redona soils.

In a typical profile of the Ratliff soil, the surface layer is reddish brown fine sandy loam about 8 inches thick. The subsoil is light reddish brown sandy clay loam about 30 inches thick. The substratum is pink sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

In a typical profile of the Redona soil, the surface layer is reddish brown fine sandy loam about 12 inches thick. The subsoil is reddish brown sandy clay loam about 27 inches thick. The substratum is light reddish brown sandy clay loam and pink clay loam to about 65 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on both soils consists mainly of blue grama, sideoats grama, little bluestem, black grama, plains bristlegrass, small soapweed, perennial and annual forbs, and common winterfat.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as sideoats grama, little bluestem, black grama, plains bristlegrass, and winterfat. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in lesser amounts, such as blue grama, sand dropseed, threeawn, ring muhly, and broom snakeweed, will increase. Under these conditions, blue grama generally takes on a dense, low growing turf which is low in productivity. Mesquite will easily invade as the site deteriorates.

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In a typical profile of the Redona soil, the surface layer is reddish brown fine sandy loam about 12 inches thick. The subsoil is reddish brown sandy clay loam about 27 inches thick. The substratum is light reddish brown sandy clay loam and pink clay loam to about 65 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on both soils consists mainly of blue grama, sideoats grama, little bluestem, black grama, plains bristlegrass, small soapweed, perennial and annual forbs, and common winterfat.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as sideoats grama, little bluestem, black grama, plains bristlegrass, and winterfat. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in lesser amounts, such as blue grama, sand dropseed, threeawn, ring muhly, and broom snakeweed, will increase. Under these conditions, blue grama generally takes on a dense, low growing turf which is low in productivity. Mesquite will easily invade as the site deteriorates.

Range seeding on these soils is suitable but is limited due to the low probability of precipitation. Adapted species suitable for seeding include improved varieties of sideoats grama, little bluestem, black grama, and blue grama. Chemical and mechanical brush management of mesquite is suitable on these soils.

44 -- Amarillo-Arvana association

This association consists of well drained, level soils formed in loamy calcareous alluvial and eolian materials on the High Plains in the eastern part of the area at elevations of 4,400 to 4,500 feet. The average annual precipitation is about 15 inches, and the mean annual air temperature is about 60° F. The average growing season is about 190 days. The Amarillo loamy fine sand, 0 to 1 percent slopes makes up about 60 percent of the mapping unit and is on the depressions. The Arvana loamy fine sand, 0 to 2 percent slopes makes up about 30 percent and is on the low ridges.

Included with this association in mapping are small areas of Brownfield and Tivoli soils, a sandy calcareous soil with a calcic horizon below 20 inches, and a soil similar to the Arvana soil, except it is 4 to 10 inches deep to indurated caliche and is more sandy. These inclusions make up about 10 percent of this unit. The nearly level Brownfield soils are on the depressions intermixed with the Amarillo soil. The moderately rolling Tivoli soils are on dune areas, and sand bluestem is common on this soil. The nearly level calcareous soil is on the depressions in association with the Amarillo soil. The nearly level soils similar to the Arvana soil are on the low ridges associated with the Arvana soil.

The Amarillo soil is a deep soil.

In a typical profile of the Amarillo soil, the surface layer is brown loamy fine sand about 7 inches thick. The subsoil is reddish brown fine sandy loam and yellowish red sandy clay loam about 29 inches thick. The substratum is white sandy clay loam to about 50 inches. Below this, to a depth of 60 inches, is strongly cemented caliche.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 50 inches. Surface runoff is slow, and erosion hazard is very high from wind and slight from water.

The Arvana soil is a moderately deep soil.

In a typical profile of the Arvana soil, the surface layer is reddish brown loamy fine sand about 5 inches thick. The upper part of the subsoil is reddish brown fine sandy loam about 6 inches thick. The lower part of the subsoil is yellowish red sandy clay and gravelly sandy clay loam about 22 inches thick. Below this, at a depth of about 33 inches, is indurated caliche.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 33 inches. Surface runoff is slow, and erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The potential native plant community of the Amarillo soils consists mainly of little bluestem, sideoats grama, blue grama, black grama, sand sagebrush, and shinnery oak. The potential native plant community of the Arvana soils consists mainly of sideoats grama, blue grama, little bluestem, black grama, New Mexico feathergrass, catclaw mimosa, and small soapweed.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as little bluestem, sideoats grama, black grama, and New Mexico feathergrass. Deferment from grazing during the period of April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as blue grama, sand dropseed, threeawn, broom snakeweed, and shinnery oak, will increase on the Amarillo soils. Blue grama, threeawn, sand sagebrush, catclaw mimosa, and broom snakeweed will increase on the Arvana soils. Shinnery oak and mesquite will easily invade the Arvana soils as the plant community deteriorates. Mesquite will invade the Amarillo soils as the plant community deteriorates. As the plant community deteriorates, it is usually accompanied by a loss of plant cover and plant residue, causing a wind erosion hazard.

Range seeding is suitable on both soils. However, it is limited due to the wind eroison hazard. Adapted species suitable for seeding include improved varieties of little bluestem, sideoats grama, blue grama, and black grama. Chemical brush management of shinnery oak, catclaw mimosa, and mesquite is suitable by aerial spraying. Mechanical treatment, such as mechanical brush control, pitting, or furrowing, is not suitable on this soil due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to low runoff and the shallow depth to caliche. Range practices, such as fencing and livestock pipelines, may be difficult to install on the Arvana soils due to the shallow depth to indurated caliche.

45 -- Arvana-Amarillo association

This association consists of well drained, level soils formed in loamy calcareous alluvial and eolian materials on the High Plains in the eastern part of the area at elevations of 4,400 to 4,500 feet. The average annual precipitation is about 15 inches, and the mean annual air temperature is about 60° F. The average growing season is about 190 days. The Arvana fine sandy loam, 0 to 2 percent slopes makes up about 50 percent of the mapping unit and is on the low ridges. The Amarillo fine sandy loam, 0 to 1 percent slopes makes up about 40 percent and is on the depressions.

Included with this association in mapping are small areas of Portales and Arch soils and a soil similar to the Arvana soils, except it is 4 to 10 inches deep and more sandy. These inclusions make up about 10 percent of this unit. The nearly level Portales and Arch soils are on the depressions and have stands of blue grama. The nearly level soils similar to the Arvana soils are on the low ridges in association with the Arvana soil.

The Arvana soil is a moderately deep soil.

In a typical profile of the Arvana soil, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is reddish brown sandy clay loam about 17 inches thick. Below this, at a depth of 25 inches, is white indurated caliche.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 25 inches. Surface runoff is slow, and the erosion hazard is high from wind and slight from water.

The Amarillo soil is a deep soil.

In a typical profile of the Amarillo soil, the surface layer is brown and reddish brown fine sandy loam about 12 inches thick. The subsoil is reddish brown and light reddish brown sandy clay loam about 48 inches thick. The substratum is white sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

This association is used mainly for range.

The potential native plant community of these soils consists mainly of black grama, blue grama, little bluestem, sideoats grama, small soapweed, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as black grama, little bluestem, and sideoats grama. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as blue grama, threeawn, buffalograss, catclaw mimosa, and broom snakeweed, will increase. Sand sagebrush, shinnery oak, and mesquite will invade these soils as the plant community deteriorates. Blue grama usually forms a dense, low growing turf and is low in productivity.

Range seeding is suitable on both soils. Adapted species suitable for seeding include improved varieties of black grama, blue grama, little bluestem, and sideoats grama. Chemical brush management of sand sagebrush, shinnery oak, and mesquite is suitable by aerial spraying.

Earthen ponds are generally unsuitable on this unit due to low runoff.

47 -- Ima loamy fine sand, 0 to 3 percent slopes

This deep, well drained, nearly level to gently sloping soil is in the south central part of the area. It formed in sandy calcareous alluvium on alluvial slopes below landscape breaks at elevations of 3,700 to 4,000 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. It makes up about 90 percent of the mapping unit.

In a typical profile of the Ima soil, the surface layer is brown loamy fine sand about 8 inches thick. The subsoil is brown loamy fine sand about 19 inches thick. The substratum is brown loamy fine sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is very high from wind and moderate from water. Gullies are common.

Small areas of Ima, eroded soils and shallow soils to bedrock were included in mapping. The Ima, eroded soils are scattered throughout and have coppice dunes that are stabilized with mesquite and sparse grasses. The shallow soils to bedrock are on the ridges. These inclusions make up about 10 percent of the unit.

This soil is used mainly for range.

The potential native plant community consists mainly of giant dropseed, sand dropseed, mesa dropseed, sand bluestem, little bluestem, black grama, threeawn, small soapweed, sand sagebrush, and a large variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as giant dropseed, sand bluestem, little bluestem, and black grama. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in lesser amounts, such as mesa dropseed, threeawn, sand sagebrush, and field sandbur, will increase. Mesquite will easily invade the plant community as it deteriorates. As the plant community deteriorates, it is usually accompanied by a loss of plant cover and residue and causes severe wind erosion hazards.

Range seeding on this soil is not suitable due to the low probability of precipitation. Mechanical brush control or mechanical treatment is not suitable on this soil due to the severe wind erosion hazard. Chemical brush control of mesquite and sand sagebrush is suitable by aerial spraying.

Earthen ponds are not suitable on this unit due to rapid permeable soils and low runoff. Livestock watering facilities should be located on the shallow soils that are found as inclusions within the unit to avoid wind erosion from the sacrifice area.

48 -- Pajarito loamy fine sand, hummocky

A complete concept of this mapping unit has not been established. A small acreage has been mapped. It consists of eroded, deep soils below terrace breaks. Coppice dunes make up about 40 percent of the unit.

A probably range site is a complex of Deep Sand SD-3 and Sandy SD-3.

49 -- Ima-Roswell complex, hummocky

This complex consists of deep soils on alluvial slopes below landscape breaks in the south central part of the area at elevations of 3,700 to 4,000 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Ima fine sandy loam, 0 to 2 percent slopes, eroded makes up about 55 percent of the mapping unit and is on the interdune area. The Roswell loamy fine sand, 2 to 25 percent slopes makes up about 40 percent and is on the coppice dunes.

Included with this complex in mapping are small areas of Ratliff, eroded; Redona, eroded; and Ima loamy fine sand soils. These inclusions make up about 5 percent of this unit. The nearly level Ratliff, eroded and Redona, eroded soils are on the interdune areas in association with the Ima, eroded soils. The nearly level Ima loamy fine sand soils are on the noneroded areas.

The Ima soil is a well drained soil. It formed in sandy calcareous alluvium.

In a typical profile of the Ima soil, the surface layer is reddish brown fine sandy loam about 5 inches thick. The subsoil is reddish brown fine sandy loam about 27 inches thick. The substratum is yellowish red loamy fine sand to about 60 inches.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is medium, and erosion hazard is high from wind and moderate from water.

The Roswell soil is an excessively drained soil. It formed in eolian materials.

In a typical profile of the Roswell soil, the surface layer is reddish brown and yellowish red loamy fine sand about 20 inches thick. The substratum is yellowish red and reddish brown loamy fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches. Surface runoff is very slow, and erosion hazard is very high from wind and slight from water.

This complex is used mainly for range.

The potential native plant community of these soils consists mainly of giant dropseed, sand dropseed, mesa dropseed, sand bluestem, little bluestem, small soapweed, sand sagebrush, and a variety of perennial and annual forbs. The present plant community has deteriorated to where mesquite and annual forbs are the dominant vegetation.

Management of these areas should be designed to reduce the competition from the mesquite and allow natural revegetation to take place. Mechanical brush control of mesquite is not suitable on these soils due to the severe wind erosion hazard. Chemical brush control of mesquite is suitable by aerial spraying. The grazing management following brush control should be designed to allow the control area to be deferred from grazing during the growing season, followed by short periods of grazing before removing the livestock until after the following growing season. This treatment should be continued until there is sufficient grass cover to stabilize the dunes and interdune area.

Range seeding is not suitable on these soils due to the low probability of precipitation and the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to low runoff.

50 -- Arch fine sandy loam

A complete concept of this mapping unit has not been established. A small acreage has been mapped. It consists mainly of a shallow soil to high lime on the High Plains. Slopes are 0 to 2 percent.

A probably range site is High Lime HP-3.

51 -- Torriorthents-Philder association

This association consists of well drained soils and Rock outcrop on breaks and high terraces in the south central part of the area at elevations of 3,900 to 4,100 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Torriorthents, 2 to 30 percent slopes and Rock outcrop make up about 60 percent of the mapping unit and are on the breaks. The Philder gravelly fine sandy loam, 0 to 5 percent slopes makes up about 35 percent and is on the high terrace above the breaks.

Included with this association in mapping are small areas of Ima, Redona, Ratliff, and Blakeney soils. These inclusions make up about 5 percent of this unit. The nearly level to gently rolling Ima soils are on alluvial slopes and are intermixed with Torriorthents and Rock outcrop. The nearly level to gently sloping Redona, Ratliff, and Blakeney soils are intermixed with the Philder soils.

The Torriorthents are very shallow to shallow soils. They formed in alluvium and residuum over bedrock on the breaks.

In a typical profile of Torriorthents soil, the surface layer is yellowish red fine sandy loam about 4 inches thick. The substratum is reddish brown fine sandy loam to about 10 inches. Below this is bedrock.

Permeability is moderately rapid. The available water capacity is very low. The effective rooting depth is about 10 inches. Surface runoff is medium to rapid, and erosion hazard is high from wind and water.

The Philder soil is very shallow. It formed in calcareous alluvium.

In a typical profile of the Philder soil, the surface layer is brown gravelly fine sandy loam about 2 inches thick. The subsoil is brown very gravelly fine sandy loam about 6 inches thick. The substratum is indurated caliche at a depth of 8 inches.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 8 inches. Surface runoff is medium, and erosion hazard is moderate from wind and slight to moderate from water.

This association is used mainly for range.

The potential native plant community of the Torriorthents soil consists mainly of black grama, sand dropseed, bush muhly, plains bristlegrass, and javalinabush. The potential native plant community of the Philder soils consists mainly of black grama, bush muhly, javalinabush, creosotebush, and a large variety of shrubs and forbs.

Grazing management should be designed to maintain the plant cover and to increase the production, vigor, and reproduction of black grama and bush muhly. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as threeawn, fluffgrass, sand dropseed, and broom snakeweed, will increase on the Torriorthents soils. Sand dropseed, threeawn, fluffgrass, broom snakeweed, and creosotebush will increase on the Philder soils. Creosotebush easily invades the Torriorthents soils. Further deterioration of the plant community causes a total domination by creosotebush with very little grass production.

Range seeding is not suitable due to the low probability of precipitation and shallow depth of soils. Mechanical brush control or mechanical treatment is not suitable on these soils due to their shallow depth. Chemical brush management of creosotebush is suitable on the Philder soils.

Range practices such as fencing and livestock pipelines are difficult to install due to the rock outcroppings and shallow depth of soils.

Earthen ponds are not suitable due to the shallow depth of soil.

52 -- Holloman loam, thin solum-Gypsum land complex

This complex consists of well drained, level soils on low terraces in the south central part of the area at elevations of 3,500 to 3,600 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Holloman loam, thin solum, 0 to 2 percent slopes makes up about 60 percent of the mapping unit and is on the depressions and the upper portions. The Gypsum land, 0 to 2 percent slopes makes up about 35 percent and is on the upper portions intermixed with the Holloman loam, thin solum.

Included with this complex in mapping are small areas of Holloman and Reeves soils and a deep, dark-colored soil. These inclusions make up about 5 percent of this unit. These nearly level soils are on the depressions intermixed with the Holloman loam, thin solum soils. Commonly these soils have stands of tobosa and burrograss.

The Holloman loam, thin solum soil is very shallow. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman loam, thin solum soil, the surface layer is grayish brown loam about 3 inches thick. Below this, to a depth of 60 inches, is light gray and white gypsiferous loam and very pale brown and white gypsiferous sandy loam.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 3 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

The Gypsum land is exposed gypsiferous beds. It consists of thick beds of soft and rock gypsiferous material.

Permeability is variable. The available water capacity is very low. The effective rooting depth is about 0 inches. Surface runoff is medium, and erosion hazard is high from wind and water.

This complex is used mainly for range.

The potential native plant communities on this complex consist mainly of gyp grama, coldenia, alkali sacaton, burrograss, threeawns, gyp dropseed, and black grama in sparse stands. Scattered plants of Mormon-tea, fourwing saltbush, and soaptree yucca are also present. The overall perennial plant density on the complex is less than 10 percent.

Grazing management on this complex should be designed to increase total vegetative cover and accumulate plant litter for soil protection. The total forage yield on this complex during normal years is insufficient and too undependable on which to base a perennial livestock grazing program. Total vegetative yield is barely adequate during normal years to provide soil surface protection. Therefore, best grazing management strategy would be to graze this complex only for short periods with held-over calves during the fall following above-normal growing seasons.

As the plant communities on this complex deteriorate from continuous selective grazing, the proportion of gyp grama, black grama, and alkali sacaton decreases and the proportion of threeawns, burrograss, fluffgrass, coldenia, creosotebush, and cacti increases. This condition is accompanied by a further depletion of soil cover and soil surface loss due to wind erosion resulting in a shift in mapping unit composition from Holloman loam, thin solum to Gypsum land.

Range seeding is not practicable on this complex due to undependable precipitation and very shallow soils. The economics of livestock grazing on this compex do not justify expenditures for brush control or construction type range improvement practices.

53 -- Ustifluvents complex, flooded

This complex consists of deep, somewhat poorly drained, nearly level, frequently flooded soils formed in sandy and loamy alluvium on the floodplain of the Pecos River in the south central part of the area at elevations of 3,500 to 3,700 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Ustifluvents loam, fine sandy loam, or fine sand, 0 to 2 percent slopes makes up about 90 percent of the mapping unit.

Included with this complex in mapping are small areas of deep clayey and deep sandy soils. These inclusions make up about 10 percent of this unit. The nearly level, deep clayey soil and deep sandy soil are intermixed with the Ustifluvents.

In a typical profile of the Ustifluvent soil, the surface layer is brown loam about 12 inches thick. The substratum is stratified layers of light brown very fine sandy loam and loamy fine sand, brown silty clay, silt loam, silty clay loam and clay loam, and strong brown very fine sandy loam and loamy very fine sand to about 60 inches.

Permeability is slow to rapid. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is very high to moderate from wind and slight from water. These soils are frequently flooded and have an apparent water table in some areas.

This complex is used mainly for range.

The Ustifluvents have a potential native vegetation that consists mainly of saltcedar, willows, annual grasses, and forbs.

Grazing management is limited to the inclusions within the mapping unit. A sparse perennial plant cover allows an abundant production of annual grasses and forbs in years of favorable growing conditions.

Range seeding, mechanical brush control, mechanical treatment, and earthen ponds are not suitable on this unit due to soil texture and the hazard of frequent flooding and deposition.

54 -- Pecos-Glendale association

This association consists of deep, level, rarely flooded soils on the floodplain of the Pecos River in the central and south central parts of the area at elevations of 3,500 to 3,700 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Pecos clay loam, 0 to 1 percent slope makes up about 55 percent of the mapping unit and is on the slight depressions. The Glendale very fine sandy loam, 0 to 1 percent slope makes up about 35 percent and is on the slight ridges.

Included with this association in mapping are small areas of deep clayey and deep sandy soils. These inclusions make up about 10 percent of this unit. The nearly level, deep clayey soil is on the slight depressions intermixed with the Pecos soil. The nearly level deep sandy soil is on the slight ridges intermixed with the Glendale soil.

The Pecos soil is a moderately well drained soil. It formed in loamy and clayey stratified alluvium.

In a typical profile of the Pecos soil, the surface layer is reddish brown clay loam about 13 inches thick. The upper part of the substratum is reddish brown clay loam and clay to about 34 inches. Below this, to a depth of 60 inches, is reddish brown very fine sandy loam.

Permeability is very slow. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is moderate from wind and slight from water.

The Glendale soil is a well drained soil. It formed in sandy and loamy stratified alluvium.

In a typical profile of the Glendale soil, the surface layer is brown very fine sandy loam about 8 inches thick. The substratum is stratified layers of brown loamy fine sandy, very fine sandy loam, sandy clay loam, reddish brown sandy clay loam, and clay loam to about 60 inches.

Permeability is moderately slow. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

This association is used mainly for range and cropland.

These soils are used for irrigated cropland. Irrigated crops are mainly alfalfa, cotton, sorghum, and small grains. Minimum tillage helps to control wind erosion. Crop residue utilization helps to maintain good soil tilth and also helps to control erosion. A conservation cropping system helps to maintain good soil tilth and fertility. Reduction of soil alkalinity may be needed. Suitable irrigation methods are borders, furrows, corrugations, and sprinklers. The salt content of the available water may be too high for sprinklers. Regardless of the irrigation method used, water must be applied carefully to avoid applications of too much or too little for water conservation and optimum crop production.

The potential native plant community of these soils consists mainly of giant sacaton, alkali sacaton, tobosa, vine-mesquite, and fourwing saltbush. The Pecos soils are more productive than the Glendale soils due to their position on the landscape and soil textures.

Grazing management should be designed to increase the production, vigor, and reproduction of species such as giant sacaton, vine-mesquite, and fourwing saltbush. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as alkali sacaton, tobosa, threeawns, and mesquite, will increase. Saltcedar will easily invade both of these soils as the plant community deteriorates. Periodic removal of excess coarse stalk material by burning, shredding, or mowing every other year will help keep new growth available to livestock. Burning, if practiced, should be done in late winter or early spring when soil surface moisture is present. Resting alternate years will help maintain the plant vigor. If the loamy soil surface is not protected by vegetation or plant residue, the soil surface becomes eroded by wind.

Range seeding is not suitable on these soils due to the low probability of precipitation and wind erosion hazard. Mechanical brush control of saltcedar is suitable. However, it is limited due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to the stratified soils and flood hazard.

56 -- Tivoli-Brownfield association

This association consists of deep soils on the High Plains in the eastern part of the area at elevations of 4,400 to 4,500 feet. The average annual precipitation is about 15 inches, and the mean annual air temperature is about 60° F. The average growing season is about 190 days. The Tivoli fine sand, 2 to 13 percent slopes makes up about 50 percent of the mapping unit and is on the dunes. The Brownfield fine sand, 0 to 1 percent slopes makes up about 40 percent and is on the depressions and interdune areas.

Included with this association in mapping are small areas of Amarillo, Arvana, and Portales soils. These inclusions make up about 10 percent of this unit. The nearly level Amarillo, Arvana, and Portales soils are on the depressions and interdune areas intermixed with the Brownfield soils. The Portales soils have stands of blue grama.

The Tivoli soil is excessively drained. It formed in eolian material.

In a typical profile of the Tivoli soil, the surface layer is light brown fine sand about 9 inches thick. The substratum is light reddish brown and reddish yellow fine sand to about 60 inches.

Permeability is rapid. The available water capacity is low. The effective rooting depth is about 60 inches. Surface runoff is very slow, and erosion hazard is very high from wind and slight from water.

The Brownfield soil is well drained. It formed in sandy alluvial and eolian materials.

In a typical profile of the Brownfield soil, the surface layer is light brown and strong brown fine sand about 28 inches thick. The upper part of the subsoil is yellowish red and red sandy clay loam about 34 inches thick. The lower part of the subsoil is white clay loam to about 70 inches.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 62 inches. Surface runoff is slow, and erosion hazard is very high from wind and slight from water.

This association is used mainly for range.

The potential native plant community on the Tivoli soils consists mainly of sand bluestem, little bluestem, sand dropseed, giant sandreed, shinnery oak, sand sagebrush, and a variety of perennial and annual forbs. The potential native plant community on the Brownfield soils consists mainly of little bluestem, sand bluestem, sand dropseed, sideoats grama, New Mexico feathergrass, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of sand bluestem, little bluestem, giant sandreed, and New Mexico feathergrass. Deferment from grazing during April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in smaller amounts, such as sand dropseed, threeawn, small soapweed, sand sagebrush, and shinnery oak, will increase. As the plant community deteriorates and shinnery oak dominates the plant community, cattle should be removed from this unit when the shinnery oak is in the late bud or early leaf stage of growth. During this period of time, shinnery oak is toxic to livestock. Generally, as the plant community deteriorates, it is accompanied by a loss of plant it cover and litter which cause a severe wind erosion hazard.

Range seeding is generally suitable on these soils due to the wind erosion hazard. Chemical brush control of shinnery oak and sand sagebrush is suitable by aerial spraying.

Earthen ponds are generally unsuitable due to the low runoff and rapid permeable soils. Mechanical brush control and mechanical treatment are not suitable due to the wind erosion hazard. Livestock watering facilities should be located on the loamy-textured included soils occurring throughout the complex.

57 -- Brownfield fine sand, 0 to 2 percent slopes

This deep, well drained, nearly level soil is in the eastern part of the area. It formed in sandy alluvial and eolian materials on the High Plains at elevations of 4,400 to 4,500 feet. The average annual precipitation is about 15 inches, and the mean annual air temparature is about 60° F. The average growing season is about 190 days. It makes up about 90 percent of the mapping unit.

In a typical profile of the Brownfield soil, the upper part of the surface layer is brown fine sand about 15 inches thick. The lower part of the surface layer is reddish brown loamy fine sand about 8 inches thick. The subsoil is reddish yellow and reddish brown sandy clay loam to about 60 inches.

Permeability is moderate. The available water capacity is moderate. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is very high from wind and slight from water.

Small areas of Amarillo, Arvana, and Tivoli soils were included in mapping. The nearly level Amarillo and Arvana soils are intermixed with the Brownfield soil. The moderately undulating Tivoli soils are on the scattered dunes. These inclusions make up about 10 percent of this unit.

This soil is used mainly for range.

The potential native plant community consists mainly of little bluestem, sand bluestem, sand dropseed, sideoats grama, New Mexico feathergrass, shinnery oak, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the vigor, production, and reproduction of little bluestem, sand bluestem, sideoats grama, and New Mexico feathergrass. Deferment from grazing during April, May, and June is needed to maintain or to improve the vigor and reproduction of New Mexico feathergrass. As the plant community deteriorates, these species will decrease. Plants that occur in the potential plant community in small amounts, such as sand dropseed, sand sagebrush, small soapweed, and shinnery oak, will increase. Mesquite will easily invade the Brownfield soils as the plant community deteriorates. As the plant community deteriorates and shinnery oak dominates the plant community, cattle should be removed when shinnery oak is in the late bud or early leaf stage of growth. During this period of time, the shinnery oak is toxic to livestock. Generally, as the plant community deteriorates, it is accompanied by loss of plant cover and litter which causes a severe wind erosion hazard.

Range seeding is suitable on this soil. However, it is limited due to the wind erosion hazard. Adapted species suitable for seeding include improved varieties of sand bluestem, little bluestem, and sideoats grama. Chemical brush control of shinnery oak, sand sagebrush, and mesquite is suitable by aerial spraying. Mechanical treatment and meachnical brush control are not suitable due to the wind erosion hazard.

Earthen ponds are generally unsuitable on this unit due to the low runoff and rapid permeable soils. Livestock watering facilities should be located on the loamy-textured inclusions occurring throughout the mapping unit.

58 -- Kimbrough-Slaughter complex

This complex consists of well drained, level soils on the High Plains in the eastern part of the area at elevations of 4,300 to 4,500 feet. The average annual precipitation is about 15 inches, and the mean annual air temperature is about 60° F. The average growing season is about 190 days. The Kimbrough gravelly fine sandy loam, 0 to 2 percent slopes makes up about 70 percent of the mapping unit and is on the low ridges. The Slaughter clay loam, 0 to 1 percent slopes makes up about 20 percent and is on the depressions.

Included with this complex in mapping are small areas of Kimbrough gravelly fine sandy loam, 3 to 7 percent slopes, a moderately deep soil to indurated caliche, and a few playa lakes. These inclusions make up about 10 percent of this unit. The Kimbrough soil, 3 to 7 percent slopes is on the breaks and around the playa lakes. The nearly level, moderately deep soil to indurated caliche is intermixed with the Slaughter soil on the depressions.

The Kimbrough soil is very shallow and shallow. It formed in gravelly loamy calcareous alluvium.

In a typical profile of the Kimbrough soil, the surface layer is brown gravelly fine sandy loam about 7 inches thick. The upper part of the substratum is very pale brown gravelly fine sandy loam about 4 inches thick. Below this, at a depth of 11 inches, is indurated caliche.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 11 inches. Surface runoff is medium, and erosion hazard is slight from wind and water.

The Slaughter soil is shallow. It formed in loamy calcareous alluvium.

In a typical profile of the Slaughter soil, the surface layer is brown clay loam about 5 inches thick. The subsoil is reddish brown clay and cobbly clay about 9 inches thick. Below this, at a depth of 14 inches, is indurated caliche.

Permeability is moderately slow. The available water capacity is very low. The effective rooting depth is about 14 inches. Surface runoff is slow, and erosion hazard is slight from wind and water. This soil receives runon from the Kimbrough soil.

This complex is used mainly for range.

The potential native vegetation on the Kimbrough soils consists mainly of sideoats grama, black grama, blue grama, perennial and annual forbs, New Mexico feathergrass, and Arizona cottontop. The potential native vegetation on the Slaughter soils consists mainly of blue grama, sideoats grama, tobosa, Arizona cottontop, vine-mesquite, and buffalograss. The total annual production on the Slaughter soils will be two or three times that of Kimbrough due to the additional water received from the runoff of the Kimbrough soils.

Grazing management should be designed to increase the vigor and reproduction of sideoats grama, black grama, Arizona cottontop, and vine-mesquite. As the plant community deteriorates, these species diminish. Plants that occur in the potential plant community in small amounts, such as blue grama, ring muhly, threeawns, hairy tridens, spike pappusgrass, and broom snakeweed, will increase on Kimbrough soils. Blue grama under these consitions usually forms a dense, low growing turf. Ring muhly, threeawns, and tobosa will increase on the Slaughter soils. Cholla cactus will easily invade the Slaughter soils where seed source is available. Mesquite will invade both soils.

Range seeding is not suitable due to the shallow and very shallow soils. Mechanical brush control of cholla is limited to deeper Slaughter soils. Chemical brush control is suitable.

Earthen ponds are not suitable due to the shallow depth to indurated caliche. Fending and livestock pipelines are difficult to install on the Kimbrough soils due to the shallow depth to indurated caliche. Mechanical treatment, such as pitting and contour furrowing, is not suitable on the Kimbrough soils.

59

This mapping unit has not been named or described due to small acreage. The soils consist mainly of eroded, deep, or moderately deep soils. The moderately deep soils are underlain by hard gypsiferous material or sandstone. Coppice dunes make up about 40 percent of the unit.

A probable range site is a complex of Deep Sand SD-3 and Sandy SD-3.

61 -- Holloman loam, thin solum-Gypsum land-La Lande complex

This complex consists of well drained soils on high terraces in the south central part of the area at elevations of 3,700 to 4,000 feet. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. The Holloman loam, thin solum, 7 to 13 percent slopes makes up about 45 percent of the mapping unit and is on the ridges, side slopes, and depressions. The Gypsum land, 7 to 13 percent slopes makes up about 30 percent and is on the ridges and side slopes intermixed with the Holloman loam, thin solum. The La Lande loam, 0 to 2 precent slopes makes up about 20 percent and is on the depressions.

Included with this complex in mapping are small areas of Quay like, Reeves like, and Holloman like soils, and a fine-textured soil. These inclusions make up about 5 percent of this unit. The nearly level Quay like, Reeves like, and Holloman like soils and the fine-textured soil are on the depressions.

The Holloman loam, thin solum soil is very shallow. It formed in loamy calcareous alluvium and residuum over gypsiferous beds.

In a typical profile of the Holloman loam, thin solum soil, the surface layer is reddish brown loam about 4 inches thick. Below this, to a depth of 60 inches, is light gray and white gypsiferous loam and very pale brown gypsiferous sandy loam.

Permeability is moderate. The available water capacity is very low. The effective rooting depth is about 4 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

The Gypsum land is exposed gypsiferous beds. It consists of thick beds of soft and rock gypsiferous material.

Permeability is variable. The available water capacity is very low. The effective rooting depth is about 0 inches. Surface runoff is rapid, and erosion hazard is high from wind and water.

The La Lande soil is deep. It formed in loamy calcareous alluvium.

In a typical profile of the La Lande soil, the surface layer is yellowish red loam about 6 inches thick. The subsoil is red and light red clay loam about 24 inches thick. The substratum is red loam to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is moderate from wind and slight from water.

This complex is used mainly for range.

The Holloman loam, thin solum soils have a potential native plant community that consists mainly of gyp grama, alkali sacaton, gyp dropseed, black grama, coldenia, fourwing saltbush, and a variety of perennial and annual forbs. The vegetation will be much denser and will produce greater annual forage production when the Holloman loam, thin solum is mapped in the depressional areas. The Gypsum land has no potential native plant community. The potential native plant community of the La Lande loam consists mainly of giant dropseed, alkali sacaton, tobosa, vine-mesquite, sideoats grama, fourwing saltbush, and a variety of perennial and annual forbs. The La lande soils receive beneficial runoff from the other components of the mapping unit. The total annual production is three to four times that of the Holloman loam, thin solum soils.

Grazing management should be designed to increase the vigor, production, and reproduction of giant dropseed, vine-mesquite, sideoats grama, and fourwing saltbush on the La Lande soils and to maintain the plant cover on the Holloman loam, thin solum soils. As the plant community deteriorates, black grama, alkali sacaton, and fourwing saltbush will decrease on the Holloman loam, thin solum soils. On the La Lande soils giant dropseed, vine-mesquite, sideoats grama, and fourwing saltbush will decrease. Plants that occur in the potential plant community in smaller amounts, such as gyp grama, gyp dropseed, and coldenia, will increase on the Holloman loam, thin solum soils.

On the La Lande soils alkali sacaton, tobosa, and threeawns will increase. Generally, as the plant community deteriorates, there is a loss of vegetative cover on the Holloman loam, thin solum soils, which causes accelerated erosion and exposes the underlying gypsiferous material. Mesquite easily invades the La Lande soils as the plant community deteriorates.

Range seeding is not suitable on this mapping unit due to the low probability of precipitation and the very shallow soils. Mechanical brush control of mesquite is limited to the deeper La Lande soils. Chemical brush control is suitable on all soils in this unit. Mechanical treatment is limited to the La Lande soils.

Earthen ponds are limited to the deeper La Lande soils.

63 -- Yturbide loamy sand, moderately rolling

This deep, excessively drained, moderately rolling soil is in the south central part of the area. It formed in gravelly coarse sandy alluvium on breaks adjacent to the floodplain of the Pecos River at elevations of 3,700 to 4,000 feet. Slopes are mainly short in length. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is about 200 days. It makes up about 65 percent of the mapping unit.

In a typical profile of the Yturbide soil, the surface layer is brown loamy sand about 20 inches thick. The substratum is light reddish brown very gravelly loamy sand, very gravelly sand, sand, and pink sand to about 60 inches.

Permeability is rapid. The available water capacity is very low. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is slight from wind and moderate from water. Gullies are common.

Small areas of Roswell, Dona Ana, Holloman loam, thin solum and Ima soils were included in mapping. The moderately rolling Roswell soils are on the coppice dunes. The nearly level Dona Ana and Holloman loam, thin solum soils are scattered throughout the unit. The Holloman loam, thin solum becomes much more prominent at the edges of large drainageways. The gently sloping Ima soils are on the depressions. These inclusions make up about 35 percent of the unit.

This soil is used mainly for range.

The potential native plant community consists mainly of giant dropseed, mesa dropseed, sand dropseed, sand sagebrush, fourwing saltbush, and a variety of perennial and annual forbs.

Grazing management should be designed to increase the production, vigor, and reproduction of giant dropseed and fourwing saltbush. As the plant community deteriorates, these plants will decrease. Plants that occur in the potential plant community in smaller amounts, such as threeawn, sand sagebrush, and field sandbur, will increase. Mesquite will easily invade as the plant community deteriorates.

Range seeding is not suitable on the Yturbide soils due to the low probability of precipitaqtion. Mechanical brush management of sand sagebrush and mesquite is suitable.

Earthen ponds are generally unsuitable on this unit due to the low runoff and rapid permeable soils.

64 -- Dona Ana sandy loam, 0 to 1 percent slopes

This deep, well drained, nearly level soil is in the south central part of the area. It formed in loamy calcareous alluvium on low terraces at elevations of 3,700 to 4,000 feet. Slopes are mainly short in length. The average annual precipitation is about 12 inches, and the mean annual air temperature is about 60° F. The average growing season is 200 days.

In a typical profile of the Dona Ana soil, the surface layer is reddish brown sandy loam about 6 inches thick. The subsoil is light reddish brown sandy clay loam and clay loam about 36 inches thick. The substratum is reddish yellow very fine sandy loam and fine sand to about 60 inches.

Permeability is moderate. The available water capacity is high. The effective rooting depth is about 60 inches. Surface runoff is slow, and erosion hazard is high from wind and slight from water.

Small areas of Roswell, Holloman loam, thin solum soils, and a clayey soil were included in mapping. The moderately rolling Roswell soils are on the coppice dunes. The nearly level Holloman loam, thin solum soils are scattered throughout the unit and are on the depressions.

This soil is used mainly for range.

The potential native plant community consists mainly of black grama, mesa dropseed, sand dropseed, plains bristlegrass, blue grama, small soapweed, and forbs.

Grazing management should be designed to increase the vigor, production, and reproduction of black grama, blue grama, and plains bristlegrass. As the plant community deteriorates, these species will decrease. Plants that occur in the plant community in smaller amounts, such as threeawn, burrograss, bush muhly, broom snakeweed, and sand sagebrush, will increase. Mesquite easily invades the plant community as it deteriorates.

Range seeding is not suitable on this soil due to the low probability of precipitation. Chemical and mechanical brush control of mesquite is suitable on this soil. Mechanical treatment, such as ripping or pitting, is not suitable on this soil due to the low probability of precipitation and the high wind erosion hazard.

Earthen ponds are not suitable on this soil due to the low runoff.

65

This mapping unit has not been named or described due to small acreage. The soils consist mainly of eroded, deep sandy soils. Coppice dunes make up about 30 percent of the unit.

A probable range site is a complex of coppice dunes and interdunes of Deep Sand SD-3.

REPRESENTATIVE SOIL SERIES DESCRIPTIONS

Amarillo Series

The Amarillo series consists of deep, well drained, moderately permeable soils with a calcic horizon at a depth of about 36 inches on the High Plains.

They formed in loamy calcareous alluvial and eolian materials. Slope ranges from 0 to 2 percent.

The Amarillo soils are similar to the Faskin soils and are mapped in association with the Arvana soils. They are commonly mapped adjacent to the Brownfield, Portales, and Tivoli soils. Faskin soils are drier. Arvana soils have a petrocalcic horizon. Brownfield soils have thick sandy surface horizons over argillic horizons. Portales soils have a mollic epipedon. Tivoli soils are deep, sandy soils.

A typical pedon of Amarillo loamy fine sand from an area of Amarillo-Arvana association; occurs 0.4 mile north of the county line and 120 feet west of the road, NE 1/4, SE 1/4 sec. 32, T. 8 S., R. 33 E. (Pedon 2D, Field Sheet 528).

A1--0 to 7 inches; brown (7.5YR 4/4) loamy fine sand, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; many very fine pores; noncalcareous; neutral; clear smooth boundary.

B21t--7 to 15 inches; reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; many very fine and common fine pores; few thin clay skins on faces of pedons and in root channels; noncalcareous; mildly alkaline; clear smooth boundary.

B22t--15 to 36 inches; yellowish red (5YR 4/6) sandy clay loam, reddish brown (5YR 4/4) moist; moderate very coarse prismatic structure; very hard, very firm; slightly sticky and slightly plastic; few coarse, fine and very fine roots; many very fine and common fine pores; few thin clay films on faces of prisms and in root channels; noncalcareous; mildly alkaline; abrupt smooth boundary.

C1ca--36 to 50 inches; white (5YR 8/1) sandy clay loam, pinkish white (5YR 8/2) moist; massive; very hard, very firm, sticky and slightly plastic; many very fine pores; disseminated calcium carbonate; violently calcareous; moderately alkaline; abrupt smooth boundary.

C2cam--50 to 60 inches; white (5YR 8/1) strongly cemented caliche.

Depth to the calcic horizon ranges from 20 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 2 through 4. It is fine sandy loam or loamy fine sand.

The Bt horizon has hue of 5YR, value of 4 through 6, 3 through 5 moist, and chroma of 3 through 6. It is fine sandy loam or sandy clay loam in the upper part.

The Cca horizon has hue of 5YR, value of 8, 7 or 8 moist, and chroma of 1 or 2. It is soft to strongly cemented caliche.

Arvana Series

The Arvana series consists of moderately deep, well drained, moderately permeable soils with a petrocalcic horizon at depths of about 33 inches on the High Plains. They formed in loamy calcareous alluvial and eolian materials. Slope ranges from 0 to 2 percent.

The Arvana soils are similar to the Kimbrough soils and are mapped in association with the Amarillo soils. They are commonly mapped adjacent to the Tivoli and Brownfield soils. Kimbrough soils are shallow to a petrocalcic horizon and lack argillic horizons. Amarillo soils lack a petrocalcic horizon. Tivoli soils are deep, sandy soils. Brownfield soils have thick sandy surface horizons over argillic horizons.

A typical pedon of Arvana loamy fine sand from an area of Amarillo-Arvana association; occurs 210 feet north and 140 feet west SE corner marker sec. 24, T. 6 S., R. 31 E. (Pedon 14H, Field Sheet 340).

A1--0 to 5 inches; reddish brown (5YR 4/4) loamy fine sand, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; noncalcareous; neutral; abrupt smooth boundary.

B1--5 to 11 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

B21t--11 to 21 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

B22t--21 to 26 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine pores; noncalcareous; mildly alkaline; abrupt wavy boundary.

B23tca--26 to 33 inches; yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, friable, sticky and plastic; slightly calcareous; mildly alkaline; abrupt wavy boundary.

Ccam--33 inches; white continuous indurated caliche.

Depth to the petrocalcic horizon ranges from 20 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 or 4 moist, and chroma of 3 or 4. It is loamy fine sand or fine sandy loam.

The B1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 4.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 through 6, 3 through 5 moist, and chroma of 4 through 6. It is fine sandy clay loam or sandy loam and has a clay content of 18 to 35 percent.

The Btca horizon has hue of 2.5YR or 5YR, value of 5 or 6, 4 or 5 moist, and chroma of 4 through 6. It is gravelly sandy clay loam or gravelly fine sandy loam.

The Ccam horizon is indurated to strongly cemented, and has a thickness of about 10 inches and becomes less cemented with depth.

Bascom Series

The Bascom series consists of deep, well drained, moderately rapid permeable soils with a skeletal control section and a calcic horizon on high terraces. They formed in calcareous gravelly loamy alluvial material. Slope ranges from 2 to 7 percent.

The Bascom soils are similar to the Arch, Blakeney, Conger, and Jal like soils and are mapped in association with the Ratliff soils. They are commonly mapped adjacent to the Holloman like, Ima, La Lande, Quay like, Quay like, thin solum, and Reeves like soils. Holloman like and Reeves like soils have gypsiferous layers. Blakeney and Conger soils have petrocalcic horizons. Arch, Jal like, Ratliff, Ima, La Lande, Quay like, and Quay like, thin solum soils have less than 35 percent coarse fragments in the control section.

A typical pedon of Bascom gravelly sandy loam from an area of Bascom-Ratliff association; occurs 0.5 mile north of cattleguard and 195 feet west of road, NW 1/4, SW 1/4 sec. 3, T. 6 S., R. 26 E. (Pedon 14S, Field Sheet 7130).

A11--0 to 2 inches; light brown (7.5YR 6/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; few very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--2 to 7 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; common fine segregated filaments of calcium carbonate; strongly calcareous; moderately alkaline; clear smooth boundary.

B2ca--7 to 18 inches; pink (7.5YR 7/4) very gravelly sandy clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; 40 percent coarse fragments thickly coated with calcium carbonate; disseminated calcium carbonate; violently calcareous; moderately alkaline; clear wavy boundary.

C1ca--18 to 36 inches; pink (7.5YR 8/4) very gravelly sandy clay loam, pink (7.5YR 7/4) moist; massive; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine pores; 35 percent coarse fragments thickly coated with calcium carbonate; many large segregations and disseminated calcium carbonate; violently calcareous; moderately alkaline; clear wavy boundary.

C2ca--36 to 60 inches; reddish yellow (7.5YR 8/6) very gravelly loamy coarse sand, reddish yellow (7.5YR 7/6) moist; single grain; loose, loose, nonsticky and nonplastic; many irregular pores; 35 percent coarse fragments thickly coated with calcium carbonate; disseminated calcium carbonate; violently calcareous; moderately alkaline.

Depth to the calcic horizon ranges from 7 to 20 inches. The percent calcium carbonate content ranges from 40 to 60 percent in the control section.

The A horizon has hue of 5YR or 7.5YR, value of 5 or 6, 4 or 5 moist, and chroma of 4 through 6. It has 10 to 25 percent coarse fragments.

The Bca horizon has hue of 5YR or 7.5YR, value of 6 through 8, 5 through 7 moist, and chroma of 2 through 6. It is very gravelly sandy clay loam or very gravelly loam with 35 to 50 percent coarse fragments.

The Cca horizon has hue of 5YR or 7.5YR, value of 6 through 8, 5 through 7 moist, and chroma of 4 through 6. It is very gravelly loamy coarse sand, very gravelly fine sandy loam, or very gravelly sandy clay loam with 35 to 50 percent coarse fragments.

Blakeney Series

The Blakeney series consists of shallow, well drained, moderately rapid permeable soils with a petrocalcic horizon within 20 inches of the surface on high terraces. They formed in calcareous loamy alluvial and eolian materials. Slopes range from 0 to 5 percent.

The Blakeney soils are similar to the Conger, Kimbrough, and Philder soils and are mapped in association with the Ratliff soils. They are commonly mapped adjacent to Canez, Redona, and Ima soils. Conger soils contain more than 18 percent clay in the control section. Kimbrough soils have a mollic epipedon. Philder soils have a skeletal control section. Canez, Ratliff, and Redona soils are deep and have a calcic horizon below 20 inches. Ima soils are deep.

A typical pedon of Blakeney fine sandy loam from an area of Blakeney-Ratliff association; occurs about 1.4 miles west of Smith Ranch Headquarters and 0.55 miles north of crossroads, NE 1/4, NE 1/4 sec. 16, T. 7 S., R. 27 E. (Pedon 1S, Field Sheet 7054).

A11--0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak coarse and weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

A12--2 to 6 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many fine pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B2--6 to 13 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; strongly calcareous; moderately alkaline; abrupt wavy boundary.

Ccam--13 to 20 inches; pinkish white (7.5YR 8/2); continuous indurated caliche.

Depth to the petrocalcic horizon ranges from 7 to 15 inches. The percent coarse fragments is less than 10 percent.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4.

The B horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 or 4 moist, and chroma of 4.

The Ccam horizon is indurated to strongly cemented, and becomes less cemented with depth.

Brownfield Series

The Brownfield series consists of deep, well drained, moderately permeable soils with argillic horizons within 30 inches of the surface on the High Plains. They formed in sandy alluvial and eolian materials. Slopes range from 0 to 2 percent.

The Brownfield soils are similar to the Jalmar soils and are mapped in complex with the Tivoli soils. They are commonly mapped adjacent to the Amarillo, Arvana, and Portales soils. Jalmar soils are drier. Tivoli soils are deep and sandy. Amarillo soils have a surface horizon less than 20 inches thick. Arvana soils have a petrocalcic horizon. Portales soils have a mollic epipedon.

A typical pedon of Brownfield fine sand from an area of Tivoli-Brownfield complex; occurs 0.6 miles north of gate and 495 feet west, SW 1/4, NW 1/4 sec. 13, T. 8 S., R. 33 E. (Pedon 4D, Field Sheet 526).

A11--0 to 10 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; many very fine roots; noncalcareous; neutral; clear smooth boundary.

A12--10 to 24 inches; strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6) moist; single grain; loose, loose, nonsticky and nonplastic; common fine roots; noncalcareous; neutral; clear smooth boundary.

A13--24 to 28 inches; strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots; common fine pores; noncalcareous; neutral; abrupt smooth boundary.

B21t--28 to 41 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure; very hard, very firm, sticky and plastic; few fine roots; few very fine pores; few thin clay films on faces of peds; noncalcareous; neutral; gradual wavy boundary.

B22t--41 to 62 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate coarse prismatic structure; very hard, very firm, sticky and plastic; few very fine pores; few thin clay films on faces of peds; noncalcareous; mildly alkaline; abrupt smooth boundary.

B23tca--62 to 70 inches; white (5YR 8/1) clay loam, pinkish white (5YR 8/2) moist; massive; extremely hard, extremely firm, sticky and slightly plastic; violently calcareous; moderately alkaline.

Depth to the argillic horizon ranges from 20 to 30 inches.

The A horizon has hue of 7.5YR, value of 5 or 6, 4 or 5 moist, and chroma of 4 through 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 through 7, 4 through 6 moist, and chroma of 4 through 8.

The Btca horizon has hue of 5YR or 7.5YR, value of 7 or 8, 7 or 8 moist, and chroma of 1 or 2. It is sandy clay loam or clay loam.

Canez Series

The Canez series consists of deep, well drained, moderately permeable soils with an arigillic horizon within 20 inches on high terraces. They formed in loamy alluvial material. Slopes range from 0 to 2 percent.

The Canez soils are similar to the Faskin and Jalmar soils and are mapped in association with the Redona soils. They are commonly mapped adjacent to the Ratliff, Blakeney, Philder, and Torriorthents soils. Faskin soils have a fine sand surface and lower organic carbon content. Jalmar soils have a fine sand surface deeper than 20 inches. Redona and Ratliff soils have a calcic horizon above 40 inches. Blakeney and Philder soils have a petrocalcic horizon. Torriorthents soils are shallow to bedrock.

A typical pedon of Canez fine sandy loam from an area of Redona-Canez association; occurs about 1.0 mile northeast of windmill, NE 1/4, NE 1/4 sec. 8, T. 8 S., R. 27 E. (Pedon 13F, Field Sheet 7056).

A11--0 to 2 inches; brown (7.5YR 4/4) loamy fine sand, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; few very fine pores; noncalcareous; neutral; abrup smooth boundary.

A12--2 to 8 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak coarse prismatic breaking to weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine pores; noncalcareous; neutral; clear smooth boundary.

B21t--8 to 14 inches; yellowish red (5YR 4/6) sandy clay loam, dark yellowish red (5YR 3/6) moist; moderate coarse prismatic breaking to moderate medium and coarse subangular blocky structure; slightly hard to hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine pores; noncalcareous; neutral; clear smooth boundary.

B22t--14 to 22 inches; yellowish red (5YR 4/6) sandy clay loam, yellowish red (5YR 3/6) moist; moderate coarse prismatic breaking to moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

B23t--22 to 38 inches; yellowish red (5YR 5/8) sandy clay loam, yellowish red (5YR 4/8) moist; moderate coarse prismatic breaking to moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine pores; few fine filaments of calcium carbonate; slightly calcareous; mildly alkaline; gradual wavy boundary.

B24t--38 to 60 inches; red (2.5YR 4/8) sandy clay loam, dark red (2.5YR 3/8) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine pores; common fine filaments of calcium carbonate; slightly calcareous; mildly alkaline.

The percent calcium carbonate ranges from 5 to 15 percent in the lower part of the argillic horizon.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 4 through 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, 3 or 4 moist, and chroma of 6 through 8. It is sandy clay loam with 18 to 35 percent clay.

Dona Ana Series

The Dona Ana series consists of deep, well drained, moderately permeable soils with an argillic horizon above a calcic horizon on low terraces. They formed in loamy calcareous alluvial and eolian materials. Slopes range from 0 to 2 percent.

The Dona Ana soils are similar to the Redona and Ratliff soils. They are commonly mapped adjacent to the Bascom, Ratliff, and Yturbide soils. Redona soils are noncalcareous in the upper part of the solum. Ratliff and Yturbide soils lack an argillic horizon. Bascom soils are gravelly and lack an argillic horizon.

A typical pedon of Dona Ana sandy loam, 0 to 2 percent slopes; occurs 200 feet north of El Paso Natural Gas pipeline road and 2.6 miles east of Red Bluff Road crossing, SW 1/4, NE 1/4 sec. 35, T. 8 S., R. 25 E. (Pedon 15B, Field Sheet 7190).

A1--0 to 6 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

B21t--6 to 12 inches; light reddish brown (5YR 6/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine pores; few fine filaments of calcium carbonate; strongly calcareous; moderately alkaline; clear wavy boundary.

B22t--12 to 22 inches; light reddish brown (5YR 6/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine and common fine pores; few thin clay films on ped pores and faces; few fine filaments of calcium carbonate; strongly calcareous; strongly alkaline; gradual irregular boundary.

B23tca--22 to 32 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and plastic; common very fine roots; common very fine and fine pores; few thin clay films on ped faces and pores; many soft masses of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

B24tca--32 to 42 inches; light reddish brown (5YR 6/4) sandy clay loam, yellowish red (5YR 5/6) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few fine pores; few moderately thick clay films on ped faces and pores; many soft masses of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

IIc--42 to 52 inches; reddish yellow (5YR 6/6) very fine sandy loam, yellowish red (5YR 5/6) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots; few fine pores; violently calcareous; moderately alkaline; gradual wavy boundary.

IIC2--52 to 60 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, loose, nonsticky and nonplastic; violently calcareous; moderately alkaline.

Depth to the calcic horizon ranges from 20 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 through 6, 2 through 4 moist, and chroma of 3 through 6. It is sandy loam or sandy clay loam.

Faskin Series

The Faskin series consists of deep, well drained, moderately permeable soils with an argillic horizon within 20 inches of the surface on high terraces. They formed in loamy alluvial and eolian materials. Slopes range from 0 to 2 percent.

The Faskin soils are similar to the Amarillo, Arvana, Redona, Sharvana, Portales, Ratliff, and Jalmar soils and are mapped in association with the Pyote and Malstrom soils. They are mapped in complex with the Roswell and Malstrom like soils. They are commonly mapped adjacent to the Jal like soils. Amarillo and Arvana soils are more moist. Redona soils have a higher organic carbon content in the surface horizon. Sharvana soils have petrocalcic horizons. Portales soils have a mollic epipedon. Malstrom and Ratliff soils lack an argillic horizon. Jalmar and Pyote soils have sandy surface horizons more than 20 inches thick. Roswell soils are deepk sandy soils. Malstrom like soils have less than 18 percent clay in the argillic horizon. Jal like soils lack an argillic horizon.

A typical pedon of Faskin fine sand, 0 to 2 precent slopes; occurs 0.8 mile east of 90° bend in trail and 100 feet sout, SW 1/4, SW 1/4 sec, 18, T. 9 S., R. 31 E. (Pedon 4N, Field Sheet 544).

A11--0 to 3 inches; yellowish brown (10YR 5/4) fine sand, dark yellowish brown (10YR 3/4) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine and few coarse roots; many very fine pores; noncalcareous; mildly alkaline; abrupt wavy boundary.

A12--3 to 14 inches; yellowish brown (10YR 5/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine and few coarse roots; many very fine pores; noncalcareous; mildly alkaline; abrupt wavy boundary.

B21t--14 to 17 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, firm, slightly sticky and nonplastic; common fine roots; common very fine pores; few thin clay films on face of peds; noncalcareous; mildly alkaline; clear wavy boundary.

B22t--17 to 24 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; strong coarse prismatic structure; hard, very firm, sticky and slightly plastic; common fine roots; common fine pores; many moderately thick clay films on face of peds; noncalcareous; mildly alkaline; clear wavy boundary.

B23tca--24 to 35 inches; light reddish yellow (5YR 6/4) sandy clay loam, yellowish red (5YR 5/6) moist; strong coarse prismatic structure; hard, very firm, sticky and plastic; common fine roots; common fine pores; many medium soft masses and disseminated calcium carbonate; common moderately thick clay films on face of peds; strongly calcareous; strongly alkaline; clear wavy boundary.

B24tca--35 to 56 inches; pink (5YR 7/4) sandy clay loam, yellowish red (5YR 5/6) moist; strong coarse prismatic structure; hard, very firm, sticky and plastic; few fine roots; few fine pores; disseminated calcium carbonate; common thin clay films on face of peds; strongly calcareous; strongly alkaline; clear wavy boundary.

Cca--56 to 60 inches; pinkish white (5YR 8/2) loam, pink (5YR 7/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; disseminated calcium carbonate; violently calcareous; strongly alkaline.

Depth to an arigillic horizon ranges from 9 to 20 inches. The percent clay in the argillic horizon ranges from 18 to 35 percent.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 6, 4 or 5 moist, and chroma of 3 through 6. It is fine sand or loamy fine sand.

The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 5 or 6, 4 or 5 moist, and chroma of 4 through 6. It is sandy clay loam or fine sandy loam.

The Btca horizon has hue of 2.5YR or 5YR, value of 6 or 7, 4 or 5 moist, and chroma of 4 through 8. It is sandy clay loam or fine sandy loam.

The Cca horizon has hue of 2.5YR or 5YR, value of 5 through 8, 5 through 8 moist, and chroma of 1 through 6. It is loam, sandy clay loam, or sandy loam.

Glendale Series

The Glendale series consists of deep, well drained, moderately slow permeable soils with a stratified substratum on floodplains that rarely flood. They formed in sandy and loamy stratified alluvium. Slopes range from 0 to 1 percent.

The Glendale soils are mapped in association with the Pecos soils. They are commonly mapped adjacent to the Ustifluvents and Yturbide soils. Pecos soils have a mollic epipedon and have more clay in the control section. Ustifluvents soils have a more sandy stratified substratum and are frequently flooded. Yturbide soils are more sandy and gravelly.

A typical pedon of Glendale very fine sandy loam from an area of Pecos-Glendale association; occurs 220 feet north of powerline pole and reservoir at the northern end of cottonfield on B. F. Crawford farm, NW 1/4, NW 1/4, sec. 20, T. 7 S., R. 26 E. (Pedon 16S, Field Sheet 7130).

A11--0 to 3 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--3 to 8 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and medium roots; many fine and medium pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1--8 to 10 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C2--10 to 16 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; many fine pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C3--16 to 27 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, very sticky and plastic; few fine roots; many fine pores; common fine filaments of gypsum; strongly calcareous; mildly alkaline; abrupt smooth boundary.

C4--27 to 36 inches; reddish brown (5YR 5/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; many fine pores; few fine filaments of gypsum; strongly calcareous; mildly alkaline; abrupt smooth boundary.

C5--36 to 43 inches; reddish brown (5YR 5/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; many fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C6--43 to 60 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 3/4) moist; single grain; soft, very friable, nonstocky and nonplastic; few fine roots; common fine pores; slightly calcareous; moderately alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 through 5 moist, and chroma of 4 through 6.

The C horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 or 4 moist, and chroma of 4 through 6. It is stratified layers of fine sand, loamy fine sand, fine sandy loam, sandy clay loam, and clay loam.

Holloman Series

The Holloman series consists of shallow, well drained, moderately permeable soils with gypsiferous beds at depths of about 12 inches on high and low terraces. They formed in loamy calcareous alluvium and residuum over gypsiferous beds. Slopes range from 0 to 30 percent.

The Holloman soils are similar to Holloman loam, thin solum, Holloman like, and Holloman like, thin solum soils and were mapped in complex with Reeves soils and Gypsum land. They are commonly mapped adjacent to Blakeney and Ratliff soils. Holloman loam, thin solum soils have gypsiferous layers at depths of less than 6 inches. Holloman like and Holloman like, thin solum soils are more moist. Reeves soils have gypsic horizons deeper than 20 inches. Gypsum land is exposed gypsiferous beds. Blakeney and Ratliff soils lack gypsic horizons.

A typical pedon of Holloman loam from an area of Holloman-Gypsum land complex; occurs 0.3 mile north of U. S. 380 north of Bottomless Lake road and 0.5 mile northeast on pasture road and 30 feet east of road, SE 1/4, NW 1/4, NW 1/4 sec. 31, T. 10 S., R. 26 E. (Pedon 6S, Field Sheet 7124).

A11--0 to 2 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak medium platy structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; few fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--2 to 7 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, friable, sticky and slightly plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1--7 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, sticky and slightly plastic; common fine roots; few very fine pores; strongly calcareous; midldly alkaline; clear wavy boundary.

C2ca--12 to 15 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, friable, sticky and slightly plastic; few fine roots; few fine pores; common filaments of calcium carbonate; strongly calcareous; mildly alkaline; clear wavy boundary.

C3--15 to 43 inches; very pale brown (10YR 8/3) gypsiferous loamy sand, very pale brown (10YR 7/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine roots; common medium pores; few soft mass of calcium carbonate; strongly calcareous; neutral; clear wavy boundary.

C4--43 to 60 inches; reddish yellow (7.5YR 6/8) gypsiferous loamy sand, strong brown (7.5YR 5/8) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; strongly calcareous; mildly alkaline.

Depth to the gypsiferous beds ranges from 8 to 20 inches.

The A horizon has hue of 10YR, value of 5 or 6, 3 or 4 moist, and chroma of 3.

The C1 horizon has hue of 10YR, value of 4 or 5, 3 moist, and chroma of 3.

The Cca horizon has hue of 7.5YR or 10YR, value of 5, 4 moist, and chroma of 3 or 4.

The C horizons have apparent textures of loamy sand or sand and range widely in color, depending on the geologic formation.

Holloman, thin solum Series

The Holloman, thin solum series consists of very shallow, well drained, moderately permeable soils with gypsiferous beds at depths of 6 inches or less on high and low terraces. They formed in loamy calcareous alluvium and residuum over gypsiferous beds. Slopes range from 0 to 2 percent.

The Holloman, thin solum soils are similar to Holloman, Holloman like, and Holloman like, thin solum soils and are mapped in complex with Reeves soils and Gypsum land. They are commonly mapped adjacent to Blakeney and Ratliff soils. Holloman and Reeves soils are deeper to the gypsiferous layers. Holloman like and Holloman like, thin solum soils are more moist. Blakeney and Ratliff soils lack gypsiferous layers. Gypsum land is exposed gysiferous beds.

A typical pedon of Holloman loam, thin solum from an area of Reeves-Holloman, thin solum complex; occurs 0.1 mile south of oil pad NW 1/4, NW 1/4, SW 1/4 sec. 27, T. 10 S., R. 26 E. (Pedon 15H, Field Sheet 7124).

A11--0 to 2 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; common very fine pores; strongly calcareous; mildly alkaline; abrupt smooth boundary.

A12--2 to 5 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common very fine pores; few fine soft masses and filaments of calcium carbonate; violently calcareous; strongly alkaline; abrupt wavy boundary.

C2--5 to 10 inches; very pale brown (10YR 8/3) gypsiferous sandy loam, very pale brown (10YR 7/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine pores; common medium soft masses of calcium carbonate; strongly calcareous; neutral; clear wavy boundary.

C3--10 to 40 inches; pale yellow (2.5YR 8/4) gypsiferous sandy loam, pale yellow (2.5YR 7/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common medium soft masses of calcium carbonate; strongly calcareous; neutral.

Depth to the gypsiferous beds is 8 inches or less.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, 3 through 5 moist, and chroma of 3 or 4. It is loam or silt loam.

The C horizons have apparent textures of sandy loam, loamy sand, sand, loam, or silt loam and range widely in color, depending on the geologic formation.

Holloman like Series

The Holloman like series consists of shallow, well drained, moderately permeable soils with gypsiferous beds at depths of about 14 inches on high terraces. They formed in loamy calcareous alluvium and residuum over gypsiferous beds. Slopes range from 0 to 13 percent.

The Holloman like soils are similar to the Holloman soils and are mapped in association with the Reeves like soils and in complex with Gypsum land. They are commonly mapped adjacent to the Bascom, La Lande, and Quay like soils. Holloman soils are drier. Reeves like soils have gypsic horizons deeper than 20 inches. Bascom, La Lande, and Quay soils lack gypsiferous layers. Gypsum land is exposed gypsiferous beds.

A Typical pedon of Holloman like loam from an area of Reeves like-Holloman like association; occurs 1.4 miles east on road to microwave tower from U. S. 285 and 215 feet south, NE 1/4, SW 1/4, sec. 31, T. 4 S., R. 23 E. (Pedon 3B, Field Sheet 8112).

A1--0 to 3 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; strongly calcareous; mildly alkaline; abrupt smooth boundary.

B2--3 to 7 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium to fine subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; common very fine roots; common very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

B3ca--7 to 14 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; common very fine roots; common very fine pores; few fine soft masses and disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1--14 to 33 inches; pink (5YR 8/3) gypsiferous very fine sandy loam, light reddish brown (5YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine pores; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C2--33 to 43 inches; light reddish brown (2.5YR 6/4) gypsiferous sandy clay loam, reddish brown (2.5YR 5/4) moist; massive; hard, friable, sticky and plastic; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C3--45 to 55 inches; red (2.5YR 5/6) gypsiferous sandy clay loam, red (2.5YR 4/6) moist; massive; hard, friable, sticky and plastic; few fine filaments of calcium carbonate; mildly alkaline.

Depth to gypsiferous beds ranges from 8 to 20 inches.

The A horizon has hue of 5YR or 7.5YR, value of 5 or 6, 3 or 4 moist, and chroma of 4.

The B horizon has hue of 5YR or 7.5YR, value of 5 through 7, 4 or 5 moist, and chroma of 4. It is clay loam or loam.

The B3ca horizon has hue of 5YR or 7.5YR, value of 6 or 7, 5 moist, and chroma of 4 through 6. It is clay loam or loam.

The C horizons have apparent textures of very fine sandy loam or sandy clay loam and range widely in color, depending on the geologic formation.

Holloman like, thin solum Series

The Holloman like, thin solum series consists of very shallow, well drained, moderately permeable soils with gypsiferous beds at depths of about 5 inches on high terraces. They formed in loamy calcareous alluvium and residuum over gypsiferous beds. Slopes range from 0 to 2 percent.

The Holloman like, thin solum soils are similar to the Holloman like, Holloman, and Holloman, thin solum soils and are mapped in association with the Reeves like and Holloman like soils and in complex with Gypsum land. They are commonly mapped adjacent to Pastura and Harvey soils. Holloman like and Reeves like soils have gypsiferous layers deeper than 8 inches. Holloman and Holloman, thin solum soils are drier. Pastura and Harvey soils lack gypsiferous layers. Gypsum land is exposed gypsiferous beds.

A typical pedon of Holloman like loam, thin solum from an area of Reeves like-Holloman like association; occurs 1.35 miles east on road to microwave tower from U. S. 285 and 75 feet west on road, SE 1/4, SE 1/4 sec. 31, T. 4 S., R. 23 E. (Pedon 5H, Field Sheet 8112).

A11--0 to 1 inch; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak medium platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; slightly calcareous; moderately alkaline; abrupt smooth boundary.

A12--1 to 5 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; few fine filaments of calcium carbonate; strongly calcareous; strongly alkaline; abrupt wavy boundary.

C1--5 to 14 inches; pink (7.5YR 8/4) gypsiferous sandy loam, pink (7.5YR 7/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; disseminated calcium carbonate; strongly calcareous; mildly alkaline; clear wavy boundary.

C2--14 to 37 inches; light reddish brown (2.5YR 6/4) gypsiferous sandy clay loam, red (2.5YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine pores; disseminated calcium carbonate; strongly calcareous; mildly alkaline; clear wavy boundary.

C3--37 to 48 inches; red (2.5YR 5/6) gypsiferous sandy clay loam, red (2.5YR 4/6) moist; massive; hard, friable, sticky and slightly plastic; disseminated calcium carbonate; strongly calcareous; mildly alkaline.

Depth to the gypsiferous beds is less than 8 inches.

The A horizon has hue of 7.5YR or 5YR, value of 5 or 6, 4 moist, and chroma of 4. It is loam and fine sandy loam or loam.

The C horizons have apparent textures of sandy loam or sandy clay loam and range widely in color, depending on the geologic formation.

Ima Series

The Ima series consists of deep, well drained, moderately rapid permeable soils on alluvial slopes. They formed in sandy calcareous alluvial material. Slopes range from 0 to 7 percent.

The Ima soils are similar to the Pajarito soils and are mapped in complex with the Roswell soils. They are commonly mapped adjacent to Bascom, Blakeney, Philder, Ratliff, Reeves like, Quay like, La Lande, and Torriorthents soils. Pajarito soils are drier. Roswell soils are deep and sandy. Blakeney and Philder soils have petrocalcic horizons. Bascom soils have a skeletal control section. Reeves soils have gypsic horizons. Quay like and La Lande soils have fine loam control sections and calcic horizons. Torriorthents soils are shallow to bedrock and occur on the steep slopes above the Ima soils.

A typical pedon of Ima loamy fine sand, 0 to 3 percent slopes; occurs 1.5 miles down road going south at Acme and 1.7 miles east, NW 1/4, SW 1/4 sec. 34, T. 8 S., R. 26 E. (Pedon 6F, Field Sheet 7058).

A11--0 to 3 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; single grain; loose, very friable, nonsticky and nonplastic; common fine roots; slightly calcareous; mildly alkaline; clear wavy boundary.

A12--3 to 8 inches; brown (7.5YR 4/4) loamy fine sand, dark brown (7.5YR 3/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; common fine and very fine pores; slightly calcareous; mildly alkaline; clear wavy boundary.

B21--8 to 19 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak coarse prismatic parting to moderate coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common fine and many very fine pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B22--19 to 27 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few fine and common very fine pores; common fine filaments of calcium carbonate; strongly calcareous; mildly alkaline; gradual wavy boundary.

C1--27 to 45 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few fine and very fine pores; common fine filaments of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C2--45 to 60 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine pores; common fine filaments of calcium carbonate; violently calcareous; moderately alkaline.

Thickness of the solum ranges from 30 to more than 60 inches. The profile contains 0 to 10 percent gravels and is calcareous or noncalcareous.

The A horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 through 5 moist, and chroma of 4 and 6.

The B horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 through 5 moist, and chroma of 4 and 6. It is loamy fine sand or fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 through 6, 3 through 5 moist, and chroma of 4 and 6. It is loamy fine sand, fine sand, fine sandy loam or loam with less than 18 percent clay.

Jal like Series

The Jal like series consists of deep, well drained, moderately permeable soils with a calcic horizon within 20 inches of the surface on basins of high terraces. They formed in loamy calcareous alluvial and lacustrine materials. Slopes range from 0 to 2 percent.

The Jal like soils are similar to the Arch soils and are mapped in association with the Malstrom soils. They are commonly mapped adjacent to the Faskin, Jalmar, Malstrom like, Pyote, and Roswell soils. Arch soils are not carbonatic. Malstrom soils are not carbonatic and are deeper to the calcic horizon. Faskin, Jalmar, and Pyote soils have argillic horizons. Malstrom like soils have an argillic horizon above the calcic horizon. Roswell soils are deep, sandy soils.

A typical pedon of Jal like fine sandy loam from an area of Jal like-Malstrom association; occurs 0.25 mile north of main gravel road along power line, NE 1/4, NW 1/4 sec. 22, T. 10 S., R. 29 E. (Pedon 10B, Field Sheet 608).

A11--0 to 2 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate very fine platy structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; common very fine pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.

A12--2 to 5 inches; brown (10YR 4/3) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and few fine roots; common very fine pores; slightly calcareous; moderately alkaline; abrupt wavy boundary.

B2--5 to 15 inches; reddish brown (7.5YR 6/4) sandy clay loam, dark reddish brown (7.5YR 5/4) moist; moderate fine subangular blocky and moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; commOn very fine pores; strongly calcareous; moderately alkaline; gradual wavy boundary.

C1ca--15 to 23 inches; light brown (7.5YR 7/4) clay loam, brown (7.5YR 6/4) moist; moderate medium subangular blocky structure; hard, very friable, very sticky and plastic; common very fine roots; common very fine pores; few fine segregated filaments of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C2ca--23 to 32 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; strong fine subangular blocky structure; hard, very friable, very sticky and plastic; common very fine roots; common very fine pores; many fine and medium segregated concretions and few fine segregated filaments of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C3ca--32 to 53 inches; very pale brown (10YR 8/3) clay loam, pale brown (10YR 6/3) moist; massive; hard, very friable, very sticky and plastic; disseminated calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C4ca--53 to 60 inches; very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) moist; massive; hard, very friable, very sticky and plastic; disseminated calcium carbonate; violently calcareous; moderately alkaline.

Depth to the calcic horizon is less than 20 inches. The percent calcium carbonate equivalent in the control section is 40 percent or more.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 or 6, 4 or 5 moist, and chroma of 3 or 4. It is sandy clay loam, fine sandy loam, and is commonly absent in some pedons.

The Cca horizon has hue of 7.5YR or 10YR, value of 6 through 8, 5 through 7 moist, and chroma of 1 through 3. It is loam, clay loam, fine sandy loam, and sandy clay loam with 18 to 35 percent clay.

Jalmar Series

The Jalmar series consists of deep, well drained, moderately permeable soils with fine sand surface layers thicker than 22 inches on high terraces. They formed in sandy alluvial and eolian materials. Slope ranges from 0 to 2 percent.

The Jalmar soils are similar to the Pyote soils and are mapped in complex and association with the Roswell soils. They are commonly mapped adjacent to the Faskin, Jal like, Malstrom, and Malstrom like soils. The Pyote soils have less than 18 percent clay in the argillic horizon. Roswell soils lack argillic horizons and are deep and sandy. Faskin soils have argillic horizons above 20 inches. Jal like, Malstrom, and Malstrom like soils have calcic horizons above 40 inches.

A typical pedon of Jalmar fine sand from an area of Roswell-Jalmar complex; occurs 600 feet north and 300 feet west of cattle guard, SE 1/4, NW 1/4 sec. 1, T. 10 S., R. 30 E. (Pedon 10H, Field Sheet 544).

A11--0 to 6 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine roots; vesicular pores; noncalcareous; neutral; abrupt smooth boundary.

A12--6 to 12 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine roots; vesicular pores; noncalcareous; neutral; clear wavy boundary.

A13--12 to 22 inches; reddish yellow (7.5YR 7/6) fine sqnd, strong brown (7.5YR 5/6) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine roots; vesicular pores; noncalcareous; neutral; clear wavy boundary.

A3--22 to 34 inches; reddish yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; vesicular pores; noncalcareous; neutral; abrupt wavy boundary.

B21t--34 to 45 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse prismatic parting to weak coarse subangular blocky structure; hard, firm, sticky and plastic; continuous clay films on prism faces; few fine and medium roots; many very fine pores; noncalcareous; neutral; clear wavy boundary.

B22t--45 to 57 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse prismatic parting to weak coarse subangular blocky structure; hard, firm, sticky and plastic; continuous clay films on prism sides; few fine and medium roots; many very fine pores; noncalcareous; neutral; clear wavy boundary.

B23t--57 to 60 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; clay bridging between sand grains; noncalcareous; neutral.

Thickness of the solum ranges from 60 to 80 inches. Some pedons have calcic horizons below 60 inches.

The A horizon has hue of 5YR or 7.5YR, value of 5 through 7, 4 or 5 moist, and chroma of 4 through 6. It is 20 to 40 inches thick. The A3 horizon is fine sand or loamy fine sand.

The Bt horizon has hue of 2.5YR or 5YR, value of 5 or 6, 4 or 5 moist, and chroma of 6 or 7. It has 20 to 35 percent clay and is neutral to mildly alkaline.

Kimbrough Series

The Kimbrough series consists of very shallow and shallow, well drained, moderately permeable soils with a petrocalcic horizon within 20 inches of the surface on the High Plains. They formed in calcareous gravelly loamy alluvial material. Slopes range from 0 to 5 percent.

The Kimbrough soils are similar to the Slaughter, Blakeney, and Arvana soils and are mapped in complex with the Slaughter soils. Slaughter soils have argillic horizons and contain more than 35 percent clay in the control section. Arvana soils are 20 to 40 inches deep to a petrocalcic horizon and have argillic horizons. Blakeney soils have an ochric epipedon.

A typical pedon of Kimbrough gravelly fine sandy loam from an area of Kimbrough-Slaughter complex; occurs 100 feet west and 80 feet south of fence corner SW 1/4, NE 1/4 sec. 26, T. 10 S., R. 31 E. (Pedon 1N, Field Sheet 612).

A1--0 to 7 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1-7 to 11 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2cam--11 to 15 inches; white (N 8/) indurated caliche layer containing a few fractures; laminar in the upper part; becomes softer with depth.

Depth to the petrocalcic horizon ranges from 4 to 17 inches. The control section is gravelly fine sandy loam, gravelly loam or loam, and contains 10 to 35 percent coarse fragments.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, 2 or 3 moist, and chroma of 2 or 3.

The C1 horizon has hue of 7.5YR or 10YR, value of 3 through 5, 2 or 3 moist, and chroma of 2 or 3.

The Ccam horizon ranges from fractured and indurated to continuously indurated with thick or thin laminar. It becomes less cemented with depth.

La Lande Series

The La Lande series consists of deep, well drained, moderately permeable soils with a cambic horizon on alluvial slopes. They formed is loamy calcareous alluvium. Slopes range from 0 to 2 percent.

The La Lande soils are similar to the Ima and Quay like, thin solum soils and are mapped in association with the Quay like soils and in complex with Holloman, thin solum soils and Gypsum land. They are commonly mapped adjacent to the Bascom, Holloman like, and Reeves like soils. Ima soils contain less than 18 percent clay in the control section. Quay like, thin solum, Qual like, and Bascom soils have a calcic horizon. Holloman, thin solum, Holloman like, and Reeves like soils have gypsiferous layers. Gypsum land is exposed gypsiferous beds.

A typical pedon of La Lande loam from an area of La Lande-Quay like association; occurs 0.44 mile east from U. S. 285 to El Paso Natural gas pump station and 90 feet south, NW 1/4, NE 1/4 sec 13, T. 7 S., R. 23 E. (Pedon 6H, Field Sheet 8116).

All--0 to 2 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--2 to 6 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common, very fine pores; strongly calcareous; strongly alkaline; clear smooth boundary.

B21--6 to 11 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine and fine pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B22ca--11 to 30 inches; light red (2.5YR 6/6) clay loam, red (2.5YR 5/6) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine pores; few fine soft masses of calcium carbonate; strongly calcareous; moderately alkaline; gradual wavy goundary.

C1--30 to 60 inches; red (2.5YR 5/8) loam, red (2.5YR 4/8) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine pores; strongly calcareous; moderately alkaline.

The A horizon has hue of 5YR, value of 4 through 6, 3 or 4 moist, and chroma of 4 through 6.

The B horizon has hue of 2.5YR or 5YR, value of 5 or 6, 4 moist, and chroma of 6. It is clay loam or loam.

The Bca horizon has hue of 2.5YR or 5YR, value of 6, 4 or 5 moist, and chroma of 4 through 6. It is clay loam or loam.

The C horizon has hue of 2.5YR or 5YR, value of 5 or 6, 3 through 5 moist, and chroma of 4 through 8. It is loam, fine sandy loam, or clay loam.

Malstrom Series

The Malstrom series consists of deep, well drained, moderately rapid permeable soils with loamy fine sand surfaces on intermittent lakes and drainageways. They formed in sandy calcareous alluvial and eolian materials. Slopes range from 0 to 4 percent.

The Malstrom soils are similar to the Malstrom like, Ima, and Jal like soils and are mapped in complex with the Faskin and Jal like soils. They are commonly mapped adjacent to the Roswell, Faskin, Pyote, Jalmar, Malstrom like, Redona, and Ratliff soils. Malstrom like, Faskin, Jalmar, and Redona soils have argillic horizons. Ima and Pyote soils lack a calcic horizon. Jal like soils have calcic horizons within 20 inches of the surface. Ratliff soils have fine sandy loam surface horizons. Roswell soils lack a calcic horizon and are deep, sandy soils.

A typical pedon of Malstrom loamy fine sand from an area of Jal like-Malstrom association: occurs 0.4 mile north of main gravel road, NE 1/4, NW 1/4 sec. 22, T. 10 S., R. 29 E. (Pedon 3F, Field Sheet 608).

A1--0 to 4 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/3) moist; single grain; loose, very friable, nonsticky and nonplastic; many fine roots; many very fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

B2--4 to 14 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine and few fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

C1--14 to 26 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and slightly plastic; common very fine and few fine roots; common very fine and few fine pores; few fine soft masses of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C2ca--26 to 46 inches; pink (7.5YR 7/4) loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; disseminated calcium carbonate; violently calcareous; strongly alkaline; clear wavy boundary.

C3ca--46 to 60 inches; pink (7.5YR 7/4) fine sandy loam, light brown (7.5YR 6/4) moist; massive; hard, firm, nonsticky and nonplastic; disseminated calcium carbonate; violently calcareous; strongly alkaline.

Depth to the calcic horizon ranges from 20 to 30 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, 4 or 5 moist, and chroma of 3 or 4. It is loamy fine sand or fine sandy loam.

The C1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, 4 or 5 moist, and chroma of 3 or 4. It is fine sandy loam or loamy fine sand.

The Cca horizon has hue of 7.5YR or 10YR, value of 6 through 8, 6 or 7 moist, and chroma of 3 or 4. It is loam or fine sandy loam. The percent calcium carbonate ranges from 15 to 30 percent.

Malstrom like Series

The Malstrom like series consists of deep, well drained, moderately rapid permeable soils with a calcic horizon at depths of about 24 inches on high terraces. They formed in sandy calcareous alluvial and eolian materials. Slopes range from 0 to 2 percent.

The Malstrom like soils are similar to the Malstrom and Faskin soils and are mapped in complex with the Faskin and Pyote soils. They are commonly mapped adjacent to the Jalmar and Roswell soils. Malstrom soils lack an argillic horizon above the calcic horizon. Faskin soils have more clay in the argillic and less calcium carbonate in the calcic horizon. Pyote soils lack calcic horizons above 60 inches. Jalmar soils have fine sand and loamy fine sand surface horizons thicker than 20 inches. Roswell soils are deep and sandy.

A typical pedon of Malstrom like fine sand from an area of Malstrom like-Pyote complex; occurs 80 feet east and 0.4 mile south of windmill NE 1/4, SE 1/4, sec. 34, T. 9 S., R. 31 E. (Pedon 3N, Field Sheet 544).

A11--0 to 8 inches; brown (10YR 5/3) fine sand, brown (10YR 4/3) moist; single grain; loose, loose, nonsticky and nonplastic; many very fine roots; common very fine pores; noncalcareous; neutral; clear wavy boundary.

A12--8 to 17 inches; yellowish brown (10YR 5/4) fine sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, loose, nonsticky and nonplastic; many very fine roots; common very fine pores; noncalcareous; neutral; clear wavy boundary.

B2t--17 to 24 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; loose, loose, nonsticky and nonplastic; many very fine roots; common very fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

C1ca--24 to 28 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many medium concentrated areas of calcium carbonate; moderately alkaline; clear wavy boundary.

C2ca--28 to 50 inches; white (10YR 8/1) fine sandy loam, light gray (19YR 7/2) moist; massive; soft, very friable, nonsticky and slightly plastic; common very fine roots; common very fine pores; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

C3--50 to 60 inches; very pale brown (10YR 7/3) loamy fine sand, light gray (10YR 7/2) moist; single grain; loose, loose, nonsticky and nonplastic; disseminated calcium carbonate; strongly alkaline.

Depth to the calcic horizon ranges from 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 5 or 6, 3 through 5 moist, and chroma of 3 or 4. It is fine sand or loamy fine sand.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, 4 or 5 moist, and chroma of 3 or 4. It is loamy fine sand or fine sandy loam with 10 to 18 percent clay.

The Cca horizon has hue of 10YR or 7.5YR, value of 7 or 8, 6 or 7 moist, and chroma of 1 through 3. It is loamy fine sand, fine sandy loam, or loam with 15 to 25 percent calcium carbonate.

Pecos Series

The Pecos series consists of deep, moderately well drained, very slow permeable soils with a mollic epipedon on floodplains that rarely flood. They formed in loamy and clayey stratified alluvium. Slopes range from 0 to 1 percent.

The Pecos soils are mapped in association with the Glendale soils. They are commonly mapped adjacent to the Ustifluvents and Yturbide soils. Glendale soils have less clay in the control section. Ustifluvents soils have a more stratified substratum and are frequently flooded. Yturbide soils are more sandy and gravelly.

A typical pedon of Pecos clay loam from an area of Pecos-Glendale association; occurs about 0.6 mile southeast of River Windmill and 100 feet north of fence, SE 1/4, NW 1/4, sec. 16, T. 6 S., R. 26 E. (Pedon 17S, Field Sheet 7132).

A11--0 to 2 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many very fine pores; slightly calcareous; moderately alkaline; abrupt smooth boundary.

A12--2 to 5 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; many very fine pores; strongly calcareous; moderately alkaline; clear smooth boundary.

A13--5 to 13 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; strong fine subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1--13 to 27 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; strong coarse angular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; many very fine and fine pores; many fine seams of gypsum; strongly calcareous; strongly alkaline; clear smooth boundary.

C2--27 to 34 inches; reddish brown (5YR 5/3) clay loam, dark reddish brown (5YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine roots; many very fine pores; many fine filaments of gypsum; strongly calcareous; strongly alkaline; clear wavy boundary.

C3--34 to 60 inches; reddish brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine pores; few fine filaments of gypsum; strongly calcareous; strongly alkaline.

The A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, 2 through 4 moist, and chroma of 2 or 3. It is sandy clay loam or clay loam.

The C1 and C2 horizons have hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 6, 2 through 5 moist, and chroma of 2 through 6. It is stratified layers of clay loam, clay, silty clay loam, and silty clay.

The C3 horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 6, 2 through 5 moist, and chroma of 2 through 6. It is stratified layers of fine sand, fine sandy loam, and sandy clay loam.

Philder Series

The Philder series consists of very shallow, well drained, moderately permeable soils with a petrocalcic horizon within 15 inches of the surface on the shoulder of breaks and ridges on old terraces. They formed in loamy calcareous alluvial material. Slopes range from 0 to 9 percent.

The Philder soils are similar to the Blakeney soils and are mapped in association with Torriorthents soils. They are commonly mapped adjacent to the Blakeney and Ratliff soils. Blakeney soils are shallow and lack skeletal control sections. Ratliff soils are deep and have calcic horizons at about 25 inches. Torriorthents soils are on the landscape breaks and have bedrock at shallow depths.

A typical pedon of the Philder very gravelly fine sandy loam from an area of Torriorthents-Philder association; occurs in the NE 1/4, SE 1/4 sec. 31, T. 7 S., R. 27 E. (Pedon F9-1, Field Sheet 7056).

A1--0 to 2 inches; brown (7.5YR 5/4) gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; few very fine pores; 20 percent coarse fragments of calcium carbonate; slightly calcareous; mildly alkaline; abrupt wavy boundary.

B2--2 to 8 inches; brown (7.5YR 5/4) very gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common to many fine and few medium roots; many very fine and few medium pores; 55 percent coarse fragments of calcium carbonate; strongly calcareous; moderately alkaline; abrupt wavy boundary.

Ccam--8 to 12 inches; pink (5YR 8/3) indurated caliche, pink (5YR 8/4) moist; violently calcareous; moderately alkaline; with depth cementation decreases.

Depth to the petrocalcic horizon ranges from 4 to 9 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4. The percent coarse fragments ranges from 10 to 20 percent.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4. The percent coarse fragments ranges from 40 to 60 percent.

The Ccam horizon has hue of 5YR, 7.5YR, or 10YR, value of 8, 6 through 8 moist, and chroma of 1 through 8. It is continuously cemented.

Pyote Series

The Pyote series consists of deep, well drained, moderately rapid permeable soils with fine sand and loamy fine sand surface layers thicker than 20 inches on high terraces. They formed in sandy alluvial and eolian materials. Slopes range from 0 to 5 percent.

The Pyote soils are similar to the Jalmar, Brownfield, and Tivoli soils and are mapped in association or complex with the Roswell, Faskin, Jalmar, and Malstrom like soils. They are commonly mapped adjacent to the Malstrom and Jal like soils. The Jalmar and Brownfield soils have more than 18 percent clay in the argillic horizon. Roswell and Tivoli soils lack argillic horizons and are deep and sandy. Faskin soils have argillic horizons above 20 inches. Malstrom like, Malstrom, and Jal like soils have calcic horizons above 40 inches.

A typical pedon of Pyote fine sand from an area of Jalmar-Roswell association; occurs 270 feet west and 135 feet north of the second cattle guard south of headquarters, SW 1/4, SW 1/4, sec. 15, T. 6 S., R. 29 E. (Pedon 17H, Field Sheet 336).

A11-0 to 6 inches; strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6) moist; single grain; loose, loose, nonsticky and nonplastic; many very fine roots; common fine pores; noncalcareous; neutral; clear smooth boundary.

A12--6 to 20 inches; brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4) moist; loose, loose, nonsticky and nonplastic; common very fine roots; noncalcareous; neutral; clear smooth boundary.

B1--20 to 24 inches; reddish yellow (5YR 6/6) loamy fine sand; yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine pores; noncalcareous; neutral; clear smooth boundary.

B2t--24 to 35 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine pores; clay bridging and films; noncalcareous; neutral; clear smooth boundary.

C1--35 to 60 inches; reddish yellow (7.5YR 7/6) loamy fine sand, reddish yellow (7.5YR 6/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine pores; noncalcareous; mildly alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 5 through 7, 4 or 5 moist, and chroma of 4 through 6. It is 20 to 40 inches thick.

The B1 horizon has hue of 5YR or 7.5YR, value of 6 or 7, 4 or 5 moist, and chroma of 4 through 6. It may be absent in some pedons.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 through 7, 4 through 6 moist, and chroma of 4 through 6. It is fine sandy loam with 18 percent clay.

The C horizon has hue of 5YR or 7.5YR, value of 5 through 7, 4 through 6 moist, and chroma of 4 through 6. It is loamy fine sand or fine sand and is noncalcareous or calcareous with less than 15 percent calcium carbonate. Calcic horizons may occur below 60 inches.

Quay like Series

The Quay like series consists of deep, well drained, moderately permeable soils with a calcic horizon at depths of about 15 inches on alluvial slopes. They formed in loamy calcareous alluvium. Slopes range from 0 to 3 percent.

The Quay like soils are similar to the Quay like, thin solum soils and are mapped in association with the La Lande and Quay like, thin solum soils. They are commonly mapped adjacent to the Bascom, Reeves like, and Holloman like soils and Gypsum land. La Lande soils lack calcic horizons. Quay like, thin solum soils have calcic horizons above 15 inches. Bascom soils have a skeletal control section and lack a petrocalcic horizon. Reeves like and Holloman like soils have gypsiferous layers. Gypsum land is exposed gypsiferous beds.

A typical pedon of Quay like loam from an area of La Lande-Quay like association; occurs 0.15 mile south of U. S. G. S. elevation marker K92 and 200 feet east, NW 1/4, SW 1/4 sec. 3, T. 4 S., R. 23 E. (Pedon 2H, Field Sheet 8112).

All--0 to 2 inches; reddish brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine tubular pores; noncalcareous; mildly alkaline; abrupt smooth boundary.

A12--2 to 6 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; noncalcareous; mildly alkaline; abrupt smooth boundary.

B21--6 to 15 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; strongly calcareous; midlly alkaline; clear smooth boundary.

B22ca--15 to 24 inches; reddish yellow (5YR 6/8) sandy clay loam, yellowish red (5YR 5/8) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B3--24 to 53 inches; light red (2.5YR 6/6) sandy clay loam, red (2.5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; strongly calcareous; mildly alkaline; clear smooth boundary.

C1--53 to 60 inches; light red (2.5YR 6/6) loamy fine sand, red (2.5YR 4/6) moist; massive; loose, loose, nonsticky and nonplastic; few very fine roots; many very fine pores; strongly calcareous; moderately alkaline.

Depth to maximum calcium carbonate accumulation ranges from 15 to 30 inches. The percent calcium carbonate ranges from 15 to 30 percent in the calcic horizon.

The A horizon has hue of 5YR or 7.5YR, value of 5, 4 moist, and chroma of 4 through 6.

The B horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 6, 4 or 5 moist, and chroma of 4 through 6. It is sandy clay loam or clay loam.

The C horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 6 or 7, 4 through 6 moist, and chroma of 4 through 6. It is loamy fine sand, fine sandy loam, sandy clay loam, or clay loam.

Quay like, thin solum Series

The Quay like, thin solum series consists of deep, well drained, moderately permeable soils with a calcic horizon at depths of less than 15 inches on alluvial slopes. They formed in loamy calcareous alluvium. Slopes range from 1 to 3 percent.

The Quay like, thin solum soils are similar to the Quay like soils and are mapped in association with the Quay like soils. They are commonly mapped adjacent to the La Lande, Pastura, and Bascom soils. Quay like soils have a calcic horizon deeper than 15 inches and are less calcareous in the surface layer. La Lande soils lack a calcic horizon. Pastura soils have a petrocalcic horizon. Bascom soils have skeletal control sections.

A typical pedon of Quay like loam, thin solum from an area of Quay like-Quay like, thin solum association; occurs 1.2 miles west of rest stop on U. S. Highway 285 east of Mesa, New Mexico, and 230 feet north, SE 1/4, SW 1/4 sec. 17, T. 4 S., R. 22 E. (Pedon 6B, Field Sheet 8206).

A11--0 to 2 inches; light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine platy structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--2 to 9 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; strongly calcareous; moderately alkaline; clear wavy boundary.

B2ca--9 to 16 inches; reddish yellow (5YR 7/6) clay loam, reddish yellow (5YR 6/6) moist; moderate medium subangular blocky structure; hard, fribale, sticky and plastic; common very fine roots; common very fine and coarse pores; few fine soft masses of calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C1ca--15 to 29 inches; reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine and medium pores; common medium soft masses and disseminated calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C2ca--29 to 35 inches; reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; massive; hard, friable, sticky and plastic; few very fine roots; common very fine and coarse pores; few coarse soft masses of calcium carbonate; biolently calcareous; moderately alkaline; abrupt wavy boundary.

C3ca--35 to 50 inches; light red (2.5YR 6/6) clay loam, red (2.5YR 5/6) moist; massive; hard, friable, very sticky and very plastic; common very fine pores; few coarse soft masses of calcium carbonate; violently calcareous; moderately alkaline.

Depth to the calcic horizon ranges from 6 to 15 inches. The percent calcium carbonate equivalent in the A and B horizons ranges from 15 to 25 percent, and in the Cca horizons, the range is 25 to 35 percent.

The A horizon has hue of 5YR or 7.5YR, value of 5 or 6, 4 or 5 moist, and chroma of 2 through 4. It is fine sandy loam or loam.

The Bca horizon has hue of 5YR or 7.5YR, value of 6 or 7, 5 or 6 moist, and chroma of 4 through 6. It is clay loam or sanyd clay loam.

The Cca horizon has hue of 2.5YR or 5YR, value of 6 through 8, 5 or 6 moist, and chroma of 2 through 6. It is clay loam or sandy clay loam.

Ratliff Series

The Ratliff series consists of deep, well drained, moderately permeable soils with a calcic horizon above 40 inches on high terraces. They formed in calcareous loamy calcareous alluvium. Slopes range from 0 to 2 percent.

Ratliff soils are similar to the Arch and Reagan soils and are mapped in association with the Blakeney, Portales, and Redona soils. They are commonly mapped adjacent to Philder and Torriorthents soils. Arch soils have calcic horizons at depths of less than 20 inches. Reagan soils have a fine silty control section. Blakeney and Philder soils have a petrocalcic horizon. Portales soils have a mollic epipedon. Redona soils have an argillic horizon. Torriorthents soils are shallow to bedrock.

A typical pedon of Ratliff fine sandy loam from an area of Ratliff-Blakeney association; occurs 1 mile south of the Mountain Bell microwave on New Mexico Highway 70 and 100 feet west of dirt road, NE 1/4, NE 1/4 sec. 24, T. 8 S., R. 26 E. (Pedon 9S, Field Sheet 7058).

A11--0 to 2 inches; reddish brown (5YR 5/3) fine sandy loam, reddish brown (5YR 4/3) moist; moderate medium granular structure and moderate fine platy structure; soft, very friable, slightly sticky and nonplastic; few fine to many fine roots; few medium and many fine pores; common fine concretions of calcium carbonate; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2ca--47 to 55 inches; white (N 8/) fine sandy loam, pink (7.5YR 8/4) moist; massive; very hard, very firm, nonsticky and nonplastic; disseminated calcium carbonate; violently calcareous; moderately alkaline; clear wavy boundary.

C3ca--55 to 60 inches; reddish yellow (5YR 8/6) fine sandy loam, reddish yellow (5YR 6/6) moist; massive; soft, very friable, slightly sticky and nonplastic; disseminated calcium carbonate; violently calcareous; moderately alkaline.

Depth to the calcic horizon ranges from 25 to 40 inches.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, 3 or 4 moist, and chroma of 2 through 4.

The B horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 7, 3 through 6 moist, and chroma of 3 through 6. It is loam, sandy clay loam, or sandy loam.

The Cca horizon has hue of 5YR, 7.5YR, value of 6 through 8, 4 through 8 moist, and chroma of 0 through 8. It is fine sandy loam, loam, or sandy clay loam. Calcium carbonate ranges from hard or soft concretions to a powdery form.

Redona Series

The Redona series consists of deep, well drained, moderately permeable soils with an argillic horizon within 20 inches of the surface on high terraces. They formed in loamy calcareous alluvium. Slopes range from 0 to 2 percent.

The Reconda soils are similar to the Faskin, Canez, Jalmar, and Dona Ana soils and are mapped in association with the Canez, Ratliff, and Sharvana soils. They are commonly mapped adjacent to the Malstrom, Jal like, Roswell, Jalmar, Faskin, Ratliff, and Blakeney soils. Faskin soils have less organic carbon in the surface horizon. Jalmar soils have sandy surface horizons more than 20 inches thick. Canez soils lack a calcic horizon within 60 inches. Sharvana and Blakeney soils have a petrocalcic horizon. Ratliff, Jal like, and Malstrom soils lack argillic horizons. Roswell soils are deep and sandy. Dona Ana soils are calcareous throughout the profile.

A typical pedon of Redona fine sandy loam from an area of Ratliff-Redona association; occurs 0.25 mile from a north-south fence, then 0.18 mile north of the dirt road, NW 1/4, NW 1/4 sec. 34, T. 8 S., R. 30 E. (Pedon 11B, Field Sheet 532).

A11--0 to 4 inches; reddish brown (5YR 5/3) fine sandy loam, dark reddish brrown (5YR 3/2) moist; platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

A12--4 to 12 inches; reddish brown (5YR 4/3) fine sandy loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and slighty plastic; common very fine and fine roots; common very fine and fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

B21t--12 to 19 inches; reddish brown (5YR 5/3) sandy clay loam; dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; noncalcareous; mildly alkaline; clear smooth boundary.

B22t--19 to 29 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; common very fine and fine roots; common very fine and fine pores; slightly hard, very friable, slightly sticky and plastic; noncalcareous; mildly alkaline; gradual wavy boundary.

B23tca--29 to 39 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; common very fine and fine roots; common very fine and fine pores; common segregated calcium carbonate; violently calcareous; moderately alkaline; gradual wavy boundary.

C1ca--39 to 60 inches; light reddish brown (5YR 6/4) sandy clay loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; few fine roots; few fine pores; disseminated calcium carbonate; violently calcareous; moderately alkaline; clear smooth boundary.

C2ca--60 to 65 inches; pink (7.5YR 8/4) clay loam, light brown (7.5YR 6/4) moist; massive; hard, friable, sticky and plastic; disseminated calcium carbonate; moderately alkaline.

Depth to the calcic horizon ranges from 21 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 through 5.

The Bt horizon has hue of 7.5YR through 2.5YR, value of 4 or 5 or 3 through 5 moist, and chroma of 4 or 5. It is sandy clay loam or clay loam.

The C horizon has hue of 5YR or 7.5YR. It is sandy clay loam or clay loam.

Reeves Series

The Reeves series consists of moderately deep, well drained, moderately permeable soils with a gypsic horizon at depths of about 24 inches on high terraces. They formed in loamy calcareous alluvial material high in gypsum. Slopes range from 0 to 2 percent.

The Reeves soils are similar to the Reeves like and Holloman soils and are mapped in complex with the Holloman, thin solum soils and Gypsum land. The Reeves soils are commonly mapped adjacent to the Blakeney and Ratliff soils. Reeves like soils are more moist. Holloman and Holloman, thin solum soils have gypsiferous layers at depths of less than 20 inches. Blakeney and Ratliff soils lack gypsic horizons.

A typical pedon of Reeves loam from an area of Reeves-Holloman, thin solum complex; occurs 36 feet east SE corner of the oil pad located in the SW 1/4, SW 1/4, NW 1/4 sec. 27, T. 10 S., R. 26 E. (Pedon 11S, Field Sheet 7124).

A11--0 to 3 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; moderate fine platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12--3 to 8 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine pores; few fine soft masses of calcium carbonate; strongly calcareous; strongly alkaline; clear smooth boundary.

B2--8 to 14 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and common very fine roots; many very fine pores; common fine soft masses and filaments of calcium carbonate; strongly calcareous; moderately alkaline; clear wavy boundary.

Clca-14 to 24 inches; reddish yellow (5YR 6/8) clay loam, yellowish red (5YR 5/8) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and few medium roots; many very fine pores; many medium soft masses and filaments of calcium carbonate; violently calcareous; moderately alkaline; abrupt wavy boundary.

C2cs--24 to 31 inches; reddish yellow (5YR 6/6) gypsiferous sandy loam, yellowish red (5YR 5/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine and few medium roots; few very fine pores; disseminated and soft masses of calcium carbonate and gypsum crystals; strongly calcareous; mildly alkaline; gradual wavy boundary.

C3cs--31 to 60 inches; yellowish red (5YR 5/6) gypsiferous loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; dissemenated and soft masses of calcium carbonate and gypsum crystals; violently calcareous; mildly alkaline.

Depth to the gypsic horizon ranges from 20 to 40 inches. The percent gypsum and calcium carbonate ranges from 40 to 65 percent in the control section.

The A horizon has hue of 7.5YR, value of 5 or 6, 4 moist, and chroma of 4.

The B horizon has hue of 5YR, value of 5, 4 moist, and chroma of 6.

The Cca horizon has hue of 5YR, value of 6, 5 moist, and chroma of 8.

The Ccs horizons have apparent textures of loam and sandy loam, and range widely in color, depending on the geologic formation.

Reeves like Series

The Reeves like series consists of moderately deep, well drained, moderately permeable soils with a gypsic horizon at depths of about 23 inches in high terraces. They formed in loamy calcareous alluvium high in gypsum. Slopes range from 0 to 5 percent.

The Reeves like soils are similar to the Reeves and Holloman soils and are mapped in association with Holloman like soils and Gypsum land. They are commonly mapped adjacent to the Holloman like, Holloman like, thin solum, La Lande, Quay like soils, and Gypsum land. Reeves and Holloman soils are drier. Holloman like and Holloman like, thin solum soils have gypsic horizons less than 20 inches deep. La Lande and Quay like soils lack gypsic horizons. Gypsum land is exposed gypsiferous beds.

A typical pedon of Reeves like loam from an area of Reeves like-Holloman like association; 1.4 miles east on road to microwave tower from U. S. 285 and 100 feet south, NW 1/4, SW 1/4 sec. 31, T. 4 S., R. 23 E. (Pedon 4H, Field Sheet 8112).

A11--0 to 2 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.

A12--2 to 7 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B21ca--7 to 14 inches; reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine roots; common very fine pores; few fine filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

B22ca-14 to 23 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine roots; common very fine pores; few fine soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

C1cs--23 to 40 inches; pink (5YR 8/4) gypsiferous loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine pores; disseminated calcium carbonate; mildly alkaline; clear wavy boundary.

C2cs-40 to 60 inches; red (10YR 5/6) gypsiferous clay loam, red (10YR 4/6) moist; massive; slightly hard, very friable, sticky and slightly plastic; disseminated calcium carbonate and crystals of gypsum; mildly alkaline.

Depth of the gypsic horizon ranges from 20 to 40 inches. The percent gypsum and calcium carbonate ranges from 40 to 65 percent in the control section.

The A horizon has hue of 5YR or 7.5YR, value of 4 through 6, 4 or 5 moist, and chroma of 3 or 4.

The B horizon has hue of 2.5YR or 5YR, value of 5 through 7, 4 through 6 moist, and chroma of 3 through 6. It is clay loam or loam and has 18 to 30 percent clay.

The Ccs horizons have apparent textures of fine sandy loam, loam, sandy clay loam, or clay loam with 30 to 75 percent gypsum in the forms of crystals or powder. The gypsiferous material ranges widely in color, depending on the geologic formation. The hardness ranges from soft to hard but are not petrogypsic.

Roswell Series

The Roswell series consists of deep, excessively drained, rapidly permeable soils on high terraces. They formed in eolian material. Slopes range from 2 to 25 percent.

The Roswell soils are similar to the Tivoli and Pyote soils and are mapped in association or complex with the Jalmar, Faskin, Ima, and Malstrom soils. They are commonly mapped adjacent to the Malstrom like soils. Tivoli soils are more moist. Pyote, Jalmar, Faskin, and Malstrom like soils have argillic horizons. Ima soils have a cambic horizon. Malstrom soils have calcic horizons.

A typical pedon of Roswell fine sand, 1 to 15 percent slopes; occurs 0.44 mile north-northwest and 15 feet east of picnic area on U. S. Highway 380, SW 1/4, NE 1/4 sec. 30, T. 10 S., R. 30 E. (Pedon 2N, Field Sheet 610).

A11--0 to 11 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grain; loose, loose, nonsticky and nonplastic; few very fine roots; many irregular pores; noncalcareous; mildly alkaline; gradual wavy boundary.

A12--11 to 19 inches; light yellowish brown (10YR 6/4) fine sand, yellowish brown (10YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; few very fine roots; many irregualr pores; noncalcareous; mildly alkaline; gradual wavy boundary.

C--19 to 60 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; few very fine roots; many irregular pores; noncalcareous; mildly alkaline.

The A and C horizons are fine sand or loamy fine sand more than 60 inches thick. They are neutral or mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, 4 or 5 moist, and chroma of 3 or 4.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 6 or 7, 5 moist, and chroma of 4 through 6.

Sharvana Series

The Sharvana series consists of shallow, well drained, moderately permeable soils with a petrocalcic horizon within 20 inches of the surface on high terraces. They formed in loamy calcareous alluvium. Slopes range from 0 to 2 percent.

The Sharvana soils are similar to the Arvana, Faskin, Redona, Canez, Conger, Kimbrough, Amarillo, Slaughter, and Brownfield soils and are mapped in association with the Redona soils and in consociation units. They are commonly mapped adjacent to the Faskin, Redona, Ratliff, Blakeney, Jalmar, and Roswell soils. Conger, Kimbrough, and Blakeney soils lack argillic horizons. Arvana, Faskin, Redona, Canez, Brownfield, Jalmar, and Amarillo soils lack petrocalcic horizons. Slaughter soils have more than 35 percent clay in the control section. Ratliff soils lack argillic and petrocalcic horizons. Roswell soils are deep and sandy.

A typical pedon of Sharvana fine sandy loam, 0 to 2 precent slopes; occurs NE 1/4, SE 1/4 sec. 6, T. 9 S., R. 31 E. (Pedon 14B, Field Sheet 532).

A1--0 to 3 inches; reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine pores; noncalcareous; neutral; abrupt smooth boundary.

B2t--3 to 14 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse prismatic parting to weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

Ccam--14 inches; white indurated caliche.

Depth to the petrocalcic horizon ranges from 8 to 20 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, 3 or 4 moist, and chroma of 3 or 4. It is sandy clay loam or fine sandy loam.

The Ccam horizon is indurated to strongly cemented and becomes less cemented with depth.

Slaughter Series

The Slaughter series consists of shallow, well drained, moderately slow permeable soils with a petrocalcic horizon within 20 inches of the surface on the High Plains. They formed in loamy calcareous alluvium. Slopes range from 0 to 1 percent.

The Slaughter soils are similar to the Kimbrough, Sharvana, and Arvana soils and are mapped in complex with the Kimbrough soils. They are commonly mapped adjacent to the Kimbrough soils. Kimbrough soils lack argillic horizons. Sharvana soils contain less than 35 percent clay in the control section. Arvana soils are 20 to 40 inches deep to a petrocalcic horizon and have sandy clay loam argillic horizons.

A typical pedon of Slaughter clay loam from an area of Kimbrough-Slaughter complex; occurs 0.35 mile north and 10 feet east from fence corner NE 1/4 sec. 26, T. 10 S., R. 31 E. (Pedon 8H, Field Sheet 612).

A11--0 to 2 inches; brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate medium platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; noncalcareous; mildly alkaline; abrupt smooth boundary.

A12--2 to 5 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine pores; noncalcareous; mildly alkaline; abrupt smooth boundary.

B21t--5 to 10 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; strong fine subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine pores; noncalcareous; mildly alkaline; clear wavy boundary.

B22t--10 to 14 inches; reddish brown (5YR 4/4) cobbly clay, dark reddish brown (5YR 3/4) moist; massive; very hard, friable, very sticky and very plastic; few very fine roots; few very fine pores; slightly calcareous; mildly alkaline; clear waby boundary.

Ccam-14 inches; white (10YR 8/1); continuous indurated caliche.

Depth to the petrocalcic horizon ranges from 9 to 20 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 through 5, 3 to 4 moist, and chroma of 2 through 3. It is 4 to 6 inches thick.

The Bt horizon has hue of 4YR or 7.5YR, value of 4 through 5, 3 through 4 moist, and chroma of 2 through 4. It is clay loam or clay with clay content of 35 to 45 percent.

The Ccam horizon is continuous indurated caliche and becomes less cemented with depth.

Tivoli Series

The Tivoli series consists of deep, excessively drained, rapidly permeable soils on the High Plains. They formed in eolian material. Slopes range from 2 to 13 percent.

The Tivoli soils are similar to the Roswell soils and are mapped in complex with the Brownfield soils. They are commonly mapped adjacent to the Amarillo, Arvana, and Portales soils. Roswell soils are drier. Brownfield and Amarillo soils have argillic horizons. Arvana soils have argillic and petrocalcic horizons. Portales soils have a mollic epipedon.

A typical pedon of Tivoli fine sand from an area of Tivoli-Brownfield complex; occurs 0.9 mile east of cattleguard and 160 feet north, SW 1/4, SE 1/4 sec. 33, T. 8 S., R. 33 E. (Pedon 18H, Field Sheet 528).

A--0 to 9 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; many very fine roots; many irregular pores; noncalcareous; neutral; clear smooth boundary.

C1--9 to 40 inches; light reddish brown (5YR 6/4) fine sand, reddish brown (5YR 5/4) moist; single grain; loose, loose, nonsticky and nonplastic; common very fine roots; many irregular pores; noncalcareous; neutral; gradual smooth boundary.

C2--40 to 60 inches; reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6) moist; single grain; loose, loose, nonsticky and nonplastic; few very fine roots; many irregular pores; noncalcareous; neutral.

The A and C horizons are nuetral or mildly alkaline.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 6 or 7, 5 or 6 moist, and chroma of 3 or 4.

The C horizon has hue of 5YR or 7.5YR, value of 6 or 7, 5 or 6 moist, and chroma of 4 through 6.

Yturbide Series

The Yturbide series consists of deep, excessively drained, rapidly permeable soils with a gravelly loamy sand or gravelly sand control secton on breaks adjacent to the floodplain of the Pecos River. They formed in gravelly coarse sand alluvium. Slopes range from 7 to 13 percent.

The Yturbide soils are similar to the Roswell, Tivoli, Bascom, Pyote, Ima, and Pajarito soils. They are commonly mapped adjacent to the Dona Ana, Pecos, and Glendale soils. Roswell, Tivoli, Ima, and Pajarito soils are not gravelly. Bascom soils have calcic horizons. Pyote and Dona Ana soils have argillic horizons. Pecos and Glendale soils are less sandy and gravelly.

A typical pedon of Yturbide loamy sand, 7 to 13 percent slopes; occurs about 50 feet south of small dirt road and about 350 feet southwest of windmill, NE 1/4, SE 1/4 sec. 18, T. 7 S., R. 26 E. (Pedon 16B, Field Sheet 7130).

A--0 to 20 inches; brown (7.5YR 5/4) loamy sand, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few medium roots; common very fine pores; strongly calcareous; moderately alkaline; clear wavy boundary.

C1--20 to 31 inches; light reddish brown (5YR 6/4) very gravelly loamy sand, reddish brown (5YR 5/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and few medium roots; common very fine and few fine pores; few soft masses of calcium carbonate; violently calcareous; moderately alkaline; clear abrupt boundary.

C2--31 to 37 inches; light reddish brown (5YR 6/4) sand, reddish brown (5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine pores; slightly calcareous; moderately alkaline; clear wavy boundary.

C3--37 to 42 inches; light reddish brown (5YR 6/4) very gravelly sand, reddish brown (5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine pores; strongly calcareous; moderately alkaline; clear wavy boundary.

C4--42 to 53 inches; pink (5YR 7/4) sand, light reddish brown (5YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine pores; slightly calcareous; mildly alkaline; clear wavy boundary.

C5-53 to 60 inches; light reddish brown (5YR 6/4) sand, reddish brown (5YR 5/4) moist; massive, soft, very friable, nonsticky and nonplastic; slightly calcareous; moderately alkaline.

The percent coarse fragments in the control section ranges from 20 to 35 percent.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, 4 or 5 moist, and chroma of 3 or 4. The percent coarse fragments ranges from 0 to 15 percent. It is slightly to strongly calcareous.

The C horizon has hue of 5YR or 7.5YR, value of 5 through 7, 5 or 6 moist, and chroma of 3 or 4. It is stratified layers of gravelly loamy sand, gravelly sand, loamy sand, or sand. It is slightly to violently calcareous, with 0 to 15 percent calcium carbonate.

SOIL SERIES TAXONOMIC LISTING

SOIL NAME	FAMILY OR HIGHER TAXONOMIC CLASS
Amarillo	Fine-loamy, mixed, thermic Aridic Paleustalfs
Arch	Fine-loamy, mixed, thermic Ustochreptic Calciorthids
Arvana	Fine-loamy, mixed, thermic Petrocalcic Paleustalfs
Bascom	Loamy-skeletal, carbonatic, thermic Ustollic Calciorthids
Blakeney	Loamy, mixed, thermic, shallow Ustochreptic Paleorthids
Brownfield	Loamy, mixed, thermic Arenic Aridic Paleustalfs
Canez	Fine-loamy, mixed, thermic Ustollic Haplargids
Dona Ana	Fine-loamy, mixed, thermic Typic Haplargids
Faskin	Fine-loamy, mixed, thermic Ustalfic Haplargids
Glendale	Fine-silty, mixed (calcareous), thermic Typic Torrifluvents
Holloman	Loamy, gypsic, thermic, shallow Typic Torriorthents
Holloman, thin solum	Loamy, gypsic, thermic, shallow Typic Torriorthents
Holloman like	Loamy, gypsic, thermic, shallow Ustic Torriorthents
Holloman like, thin solum	Loamy, gypsic, thermic, shallow Ustic Torriorthents
Ima	Coarse-loamy, mixed, thermic Ustochreptic Camborthids
Jal like	Fine-loamy, carbonatic, thermic Ustollic Calciorthids
Jalmar	Loamy, mixed, thermic Arenic Ustalfic Haplargids
Kimbrough	Loamy, mixed, thermic, shallow Petrocalcic Calciustolls
La Lande	Fine-loamy, mixed, thermic Ustollic Camborthids

SOIL NAME	FAMILY OR HIGHER TAXONOMIC CLASS
Malstrom	Coarse-loamy, mixed, thermic Ustochreptic Camborthids
Malstrom like	Coarse-loamy, mixed, thermic Ustalfic Haplargids
Pajarito	Coarse-loamy, mixed, thermic Typic Camborthids
Pecos	Fine, mixed, thermic Torretic Haplustolls
Philder	Loamy-skeletal, calbonatic, thermic, shallow Ustollic Paleorthids
Portales	Fine-loamy, mixed, thermic Aridic Calciustolls
Pyote	Loamy, mixed, thermic Arenic Ustalfic Haplargids
Quay like	Fine-loamy, mixed, thermic Ustollic Calciorthids
Quay like, thin solum	Fine-loamy, carbonatic, thermic Ustollic Calciorthids
Ratliff	Fine-loamy, mixed, thermic Ustollic Calciorthids
Redona	Fine-loamy, mixed, thermic Ustollic Haplargids
Reeves	Fine-loamy, gypsic, thermic Typic Gypsiorthids
Reeves like	Fine-loamy, gypsic, thermic Ustollic Gypsiorthids
Roswell	Mixed, thermic Ustic Torripsamments
Sharvana	Loamy, mixed, thermic, shallow Petrocalcic Ustalfic Paleargids
Slaughter	Clayey, mixed, thermic, shallow Petrocalcic Paleustolls
Tivoli .	Mixed, thermic Typic Ustipsamments
Yturbide	Mixed, thermic Typic Torripsamments

Soil Surface Factor and Effective Rooting Depth

Series	Textural Phase	Slope Phase %	Soil Surface Factor Good Condition	Soil Surface Factor Poor Condition	Effective Rooting Depth (Inches)	Mapping Unit Symbol
Amarillo	loamy fine sand	-	10	25	4	44
	fine sandy loam	-	10	25	4	45
Arch	fine sandy loam	-	10	25	3	50
Arvana	loamy fine sand	-	10	25	4	44
	fine sandy loam	-	10	25	4	45
Bascom	gravelly fine sandy loam	-	25	37	4	13
Blakeney	fine sandy loam	-	15	35	4	15, 38
Brownfield	fine sand	-	25	47	5	56, 57
Canez	fine sandy loam	-	15	35	4	27
Dona Ana	sandy loam	-	15	35	4	64
Faskin	sandy clay loam	-	15	47	4	20
	fine sand	-	25	47	5	22
	loamy fine sand	-	25	47	5	25, 26, 34

Series	Textural Phase	Slope Phase %	Soil Surface Factor		Effective Rooting Depth (Inches)	Mapping Unit Symbol
			Good Condition	Poor Condition		
Glendale	very fine sandy loam	-	5	15	5	54
Gypsum land	-	0-5 5-30	45 58	45 58	3 3	12, 35, 52 37
Holloman	loam	-	15	25	4	35, 37
Holloman, thin solum	loam	-	15	25	3	36, 52, 61
Holloman like	loam	-	10	23	3	10, 12, 19
Holloman like, thin solum	loam	-	15	25		10, 12
Ima	loamy fine sand	-	25	47	5	47
	eroded fine sandy loam	-	25	47	5	49
Jal like	fine sandy loam	-	18	41	4	23
Jalmar	fine sand	-	25	47	5	21, 24
Kimbrough	gravelly fine sandy loam	-	5	15	3	58

Series	Textural Phase	Slope Phase %	Soil Surface Factor Good Condition	 Poor Condition	Effective Rooting Depth (Inches)	Mapping Unit Symbol
La Lande	loam	-	15	37	4	11
Malstrom	loamy fine sand	-	18	41	4	23, 25
Malstrom like	fine sand	-	25	47	5	33, 34
Pecos	clay loam	-	5	15	5	54
Philder	very gravelly fine sandy loam	-	25	37	4	51
Portales	fine sandy loam	-	10	25	4	42
Pyote	fine sand	-	25	47	5	26, 33
Quay like	loam	-	15	37	4	11, 18
Quay like, thin solum	loam	-	15	32	4	18
Ratliff	fine sandy loam	-	15	35	4	15, 38, 42, 43
Redona	fine sandy loam	-	15	35	4	27, 43

Series	Textural Phase	Slope Phase %	Soil Surface Factor Good Condition	Soil Surface Factor Poor Condition	Effective Rooting Depth (Inches)	Mapping Unit Symbol
Reeves	loam	-	15	25	4	36
Reeves like	loam	-	10	23	4	10
Roswell	loamy fine sand (coppice dune)	-	32	74	5	20, 49
	fine sand	9-30	32	74	6	24, 21, 28
Sharvana	fine sandy loam	-	15	35	4	39
Slaughter	clay loam	-	5	15	5	58
Tivoli	fine sand	9-30	32	74	6	56
Torriorthents	fine sandy loam	13-55	32	74	3	51, 29
Ustifluvents	loam	-	5	15	5	53
Yturbide	loamy sand	-	25	37	4	63

RANGE SITES BY MAPPING UNIT

Symbol	Mapping Unit	Land Resource Area	Range Site
10	Reeves like-Holloman like association	CP-2	-
	Reeves like loam	-	Loamy
	Holloman like loam	-	Loamy
	Holloman like loam, thin solum	-	Gyp Upland
11	La Lande-Quay like association (loam)	CP-2	Loamy
12	Gypsum land-Holloman like complex	CP-2	-
	Gypsum land	-	-
	Holloman like loam	-	Loamy
	Holloman like loam, thin solum	-	Gyp Upland
13	Bascom-Ratliff association	SD-3	-
	Bascom gravelly sandy loam	-	Gravelly
	Ratliff fine sandy loam	-	Sandy
15	Blakeney-Ratliff association	SD-3	-
	Blakeney fine sandy loam	-	Shallow Sand
	Ratliff fine sandy loam	-	Sandy
18	Quay like-Quay like, thin solum association (loam)	CP-2	Loamy
20	Faskin-Roswell complex, hummocky	CP-2	-
	Faskin sandy clay loam	-	Sandy Plains
	Roswell loamy fine sand (coppice dune)	-	Deep Sand
21	Roswell-Jalmar complex (fine sand)	CP-2	Deep Sand
22	Faskin fine sand, 0 to 2 percent slopes	CP-2	Sandy Plains
23	Jal like-Malstrom association	CP-2	-
	Jal like fine sandy loam	-	Limy
	Malstrom loamy fine sand	-	Sandy Plains
24	Jalmar-Roswell association	CP-2	-
	Jalmar fine sand	-	Deep Sand
	Pyote fine sand	-	Sandy Plains
	Roswell fine sand	-	Deep Sand

[illegible]bol	Mapping Unit	Land Resource Area	Range Site
25	Faskin-Malstrom association (loamy fine sand)	CP-2	Sandy Plains
26	Pyote-Faskin association (loamy fine) sand	CP-2	Sandy Plains
27	Redona-Canez association (fine sandy loam)	CP-2	Sandy Loam
28	Roswell fine sand, 10 to 30 percent slopes	CP-2	Sandhills
33	Malstrom like-Pyote complex (fine sand)	CP-2	Sandy Plains
34	Malstrom like-Faskin complex (fine sand)	CP-2	Sandy Plains
35	Holloman-Gypsum land complex	SD-3	-
	Holloman loam	-	Loamy
	Gypsum land	-	-
36	Reeves-Holloman thin solum complex	SD-3	-
	Reeves loam	-	Loamy
	Holloman loam thin solum	-	Gyp Upland
38	Ratliff-Blakeney association	SD-3	-
	Ratliff fine sandy loam	-	Sandy
	Blakeney fine sandy loam	-	Shallow Sandy
39	Sharvana fine sandy loam, 0 to 2 percent slopes	CP-2	Shallow Sand
42	Ratliff-Portales association	CP-2?	-
	Ratliff fine sandy loam	-	Sandy Loam
	Portales loam	-	Loamy
43	Ratliff-Redona association (fine sandy loam)	CP-2	Sandy Loam
44	Amarillo-Arvana association (loamy fine sand)	HP-3	Loamy Sand
45	Arvana-Amarillo association (fine sandy loam)	HP-3	Sandy
47	Ima loamy fine sand, 0 to 3 percent slopes	SD-3	Deep Sand

Symbol	Mapping Unit	Land Resource Area	Range Site
49	Ima-Roswell complex, hummocky	SD-3	-
	Ima fine sandy loam (eroded)	-	Deep Sand
	Roswell fine sand (coppice dune)	-	Deep Sand
51	Torriorthents-Philder association	SD-3	-
	Torriorthents	-	Breaks CP-2
	Philder gravelly fine sandy loam	-	Gravelly
52	Holloman thin solum-Gypsum land complex	SD-3	-
	Holloman loam, thin solum	-	Gyp Upland
	Gypsum land	-	-
53	Ustifluvents complex, flooded	SD-3	Bottomland
54	Pecos-Glendale association	SD-3	-
	Pecos clay loam	-	Bottomland
	Glendale very fine sandy loam	-	Bottomland
56	Tivoli-Brownfield complex	HP-3	-
	Tivoli fine sand	-	Sandhills
	Brownfield fine sand	-	Loamy Sand
57	Brownfield fine sand, 0 to 2 percent slopes	HP-3	Loamy Sand
58	Kimbrough-Slaughter complex	HP-3	-
	Kimbrough gravelly sandy loam	-	Very Shallow
	Slaughter clay loam	-	Loamy
61	Holloman, thin solum-Gypsum land-La Lande complex	SD-3	-
	Holloman loam, thin solum	-	Gyp Upland
	Gypsum land	-	-
	La Lande loam	-	Loamy & Draw
63	Yturbide loamy sand, moderately rolling	SD-3	Gravelly
64	Dona Ana sandy loam, 0 to 2 percent slopes	SD-3	Sandy

SOIL PHASES BY RANGE SITE

Breaks (South Exposure)

CP-2

Torriorthents

Bottomland

SD-3

Glendale very fine sandy loam
Pecos clay loam
Ustifluvents

Deep Sand

CP-2

Jalmar fine sand
Roswell fine sand (less than 8 percent slopes)
Roswell loamy fine sand (coppice dunes)

SD-3

Ima loamy fine sand
Ima fine sandy loam (eroded)
Roswell fine sand (coppice dunes) part of Ima-Roswell complex, hummocky

Draw

SD-3

La Lande loam part of Holloman, thin solum-Gypsum land-La Lande complex

Gravelly

SD-3

Bascom gravelly sandy loam
Yturbide loamy sand
Philder gravelly fine sandy loam

Gyp Hills

SD-3

(Mapping Unit 37)

Gyp Upland

CP-2

Holloman like loam, thin solum

SD-3

Holloman loam, thin solum

High Lime

HP-3

Arch fine sandy loam (Mapping Unit 50)

Limy

CP-2

Jal like fine sandy loam

Loamy

CP-2

Holloman like loam
La Lande loam
Portales loam part of Ratliff-Portales association
Quay like loam
Quay like loam, thin solum
Reeves like loam

HP-3

Slaughter clay loam

SD-3

Holloman loam
Reeves loam
La Lande loam part of Holloman, thin solum-Gypsum land-La Lande complex

Loamy Sand

HP-3

Arvana loamy fine sand
Amarillo loamy fine sand
Brownfield fine sand

Sandhills

CP-2

Roswell fine sand (greater than 8 percent slopes)

HP-3

Tivoli fine sand (greater than 8 percent slopes)

Sandy

- HP-3
  - Amarillo fine sandy loam
  - Arvana fine sandy loam
- SD-3
  - Ratliff fine sandy loam
  - Dona Ana sandy loam

Sandy Loam

- CP-2
  - Canez fine sandy loam
  - Redona fine sandy loam
  - Ratliff fine sandy loam part of Ratliff-Portales association
  - Ratliff fine sandy loam part of Ratliff-Redona association

Sandy Plains

- CP-2
  - Faskin fine sand
  - Faskin loamy fine sand
  - Faskin sandy clay loam
  - Malstrom loamy fine sand
  - Malstrom like fine sand
  - Malstrom like loamy fine sand
  - Pyote fine sand
  - Pyote loamy fine sand

Shallow Sand

- CP-2
  - Sharvana fine sandy loam

Shallow Sandy

- SD-3
  - Blakeney fine sandy loam

Very Shallow

HP-3

Kimbrough gravelly fine sandy loam

RANGE SITE DESCRIPTIONS

DRAFT

RANGE SITE DESCRIPTION

Section IIe - Technical Guide

A. SITE NO. G-70-60 Breaks (South Exposure) CP-2

B. PHYSIOGRAPHIC FEATURES

This site is on steep and very steep slopes along the sides of valleys, streams and mesas at elevations between 4200 and 6000 feet. The landscape is characteristically low escarpments and have many outcrops of caliche, sandstone and red-bed shale with soils on moderately steep benches and fans. Relief averages 600 feet, but ranges from 400 to 750 feet.

Slopes range from 20 to 80 percent. This site is south and west facing. The vegetation is not as dense or productive as the north facing slopes. As slope and relief decrease, vegetative difference is not as significant.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from 13 to 16 inches. About seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry.. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. These soils are well-drained shallow and very shallow over caliche or sandstone. Surface layers are medium to fine textured and are often stony or gravelly. Surface runoff is rapid. Available water capacity is low. Effective rooting depth varies and generally is less than 12 inches.

Effective moisture for plant growth is reduced by the southerly exposure and the drying caused by prevailing southwest winds.

2. Soils included are:

No specific soils available. General soils mapping units are more useful in describing site.

Included are:

Rock land (Northern Quay)
Rough Broken land (Harding County)
Rough Broken and Stony land (Harding County)
Rock Outcrop-Torriorthents (Guadalupe County)
Rough Broken land (Roosevelt County)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a plant community dominated by warm season grasses with a variety of forbs, shrubs, half-shrubs and dotted with an occasional tree.

2. Composition of Potential Plant Community

Approximate percentage of total annual air-dry herbage production.

Grasses and Grasslike - 77%	
Black grama	24-27
Sideoats grama	14-16
Blue grama)	14-16
Hairy grama)	
Little bluestem	8-10
New Mexico feathergrass	5-7
Sand dropseed	4-6
Threeawns	1-3
Hairy tridens	1-3
Wolftail	1-2
Silver bluestem	0-2
Bush muhly)	T-2
Hall's Panicum)	
Plains lovegrass)	
Green sprangletop)	

(Shrubs, half-shrubs, vines and trees)

Woody - 11%	
Sacahuista	0-4
Skunkbush sumac)	3-5
Oak)	
Yucca	1-3
Broom snakeweed)	1-2
Groundsel)	
Morman tea)	
Bigelow sagebrush	1-2
Juniper	0-2
Prickly pear cactus)	1-2
Catclaw acacia)	
Feather dalea)	
Javalinabush)	
Winterfat)	
Agave)	
*Mesquite	0-1

Forbs - 12%	
Buckwheat	1-3
Annual mustard	1-2
Paperflower	0-2
Ironplant)	0-2
Fleabane)	
Other annual forbs	4-6
Other perennial forbs	4-6

* In areas where this species has invaded, it should be now included in the potential plant community.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	12%
Shrubs and half-shrubs - canopy	6%
Bare ground	25%
Surface gravel	12%
Surface cobble and stones	40%
Litter - percent of area	5%
average depth in cm.	2

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 900 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 300 pounds per acre during unfavorable years. The average annual production is about 700 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site has limited grazing potential due to the slopes. Distribution of domestic livestock is the main problem. All ages and classes of livestock tend to graze the flatter slopes leaving the steeper slopes ungrazed. The site can be grazed during any season of the year. It is better suited to a younger age of cattle due to the slopes. Goats would utilize the site best. Approximately 70 percent of the total annual yield is from species that furnish forage for grazing animals when accessible. This site has a large variety of grasses, forbs and woody species which provides a good feed and nutrition for domestic livestock and browsing wildlife. Continuous yearlong grazing will cause the plant community to deteriorate to a plant community of low forage value such as threeawns, broom snakeweed and forbs. Mesquite will invade this site under heavy grazing pressure. A system of deferred grazing, which varies the season of grazing and rest in successive years, is needed to maintain or improve the plant community. Different seasons of rest benefits different species. Fall rest allows most warm season species to mature. Winter rest will benefit species such as oak and winterfat. Also, cattle show a definite preference to black grama during the late winter and it can be easily overgrazed. Winter rest will reduce the grazing pressure on this species. Spring rest (April-June) will benefit cool season species such as New Mexico feathergrass and early forbs. Summer rest will benefit sideoats grama, black grama and little bluestem.

2. Wood Products

Limited firewood can be furnished by juniper.

3. Habitat for Wildlife

(Limited deer - fair)

4. Hydrological Interpretations

Group D

Approximate hydrologic curve No. when vegetation is at its potential:
D Soils - 89.

5. Recreation and Natural Beauty

This site has fair to good recreation potential. Hiking, picnicking and camping is fair to good, limited by live water. Screening is fair. Hunting for deer and rabbits is fair to good. Hunting for upland game birds is poor to fair. The aesthetic appeal is enhanced by the break in the physiographic features from open flat grasslands. The natural beauty is also enhanced by the large variety of plants, many of which are flowering plants that bloom from early spring to late fall.

6. Endangered Plants and Animals

(Species names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	4.1-5.5	5.3-7.0	6.9-11.0	11.1+
Unfavorable years	5.3-7.0	6.8-11.0	10.9-18.0	18.1+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Sideoats grama	Blue grama	Threeawns
New Mexico feathergrass	Hairy grama	Ring muhly
Little bluestem	Wolftail	Juniper
Black grama	Hairy tridens	Annual mustard
Winterfat	Sand dropseed	Skunkbush sumac
	Yucca	Catclaw acacia
	Oak	Snakeweed
	Fleabane	Bigelow sagebrush
		Morman tea
		Prickly pear cactus
		Sacahuista
		Feather dalea
		Wooly groundsel
		Javelinabush
		Mesquite
		Buckwheats
		Silver bluestem
		Agave

(b) Deer

Primary
New Mexico feathergrass

Secondary
Blue grama
Sideoats grama
Little bluestem
Black grama
Hairy grama
Winterfat
Skunkbush sumac
Bigelow sagebrush
Oak
Feather dalea
Buckwheats
Fleabane
Juniper

Low Value
Wolftail
Hairy tridens
Sand dropseed
Threeawns

Annual mustard
Catclaw acacia
Snakeweed
Yucca
Morman tea
Prickly pear cactus
Sacahuista
Wooly groundsel
Javelinabush
Mesquite
Silver bluestem
Agave

(c) Horse

Primary
Sideoats grama
New Mexico feathergrass
Little bluestem
Black grama

Secondary
Blue grama
Hairy grama
Wolftail
Winterfat

Low Value
Hairy tridens
Sand dropseed
Threeawns
Ring muhly
Juniper
Annual mustard
Skunkbush sumac
Catclaw acacia
Snakeweed
Bigelow sagebrush
Yucca
Morman tea
Prickly pear cactus
Sacahuista
Oak
Feather dalea
Wooly groundsel
Javelinabush
Mesquite
Buckwheats
Fleabane
Silver bluestem
Agave

(d) Sheep

Primary
New Mexico feathergrass
Black grama

Secondary
Blue grama
Sideoats grama
Little bluestem
Hairy grama
Winterfat
Bigelow sagebrush
Oak
Feather dalea
Javelina bush
Buckwheats
Fleabane

Low Value
Wolftail
Hairy tridens
Sand dropseed
Threeawns
Ring muhly
Juniper
Annual mustard
Skunkbush sumac
Catclaw acacia
Snakeweed
Yucca
Morman tea
Prickly pear cactus
Sacahuista
Wooly groundsel
Mesquite
Silver bluestem
Agave

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices:

   Roy
   Tucumcari
   Las Vegas
   Santa Rosa
   Fort Sumner
   Portales
   Roswell
   Lovington

3. Field Office Sample Location:

4. Approved:

State Range Conservationist Date

Regional Range Conservationist Date

DRAFT

X

RANGE SITE DESCRIPTION

Section IIe, Technical Guide

A. SITE NO. G-70-63 Deep Sand CP-2

B. PHYSIOGRAPHIC FEATURES

This site occurs as the coarse textured aeolian and alluvial sediments on the upland plains. Slopes are nearly level to gently undulating generally less than 5 percent. Low stabilized hummocks or dunes frequently occur. Exposure varies and is not significant.

Elevation ranges from 3500 to 4200 feet.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from about 13-1/2 to 16-1/2 inches. Seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. The soils of this site are deep and excessively drained. The surface textures are fine sand or loamy fine sand and extend to a depth of 40 inches or more. The soils have rapid permeability. Available water capacity is low. The plant-soil-air-water relationship is fair. Because of the coarse textures and rapid drying of the surface, the soil, if unprotected by plant cover and organic residue, becomes wind blown and hummocks or dunes are formed around shrubs.

2. Included soils are:

Roswell fine sand, less than 8 percent slopes

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a grassland dominated by warm season mid and tall grasses. Short grasses, shrubs, half-shrubs and forbs make up an important portion of the plant community. Forbs generally fluctuate greatly from year to year, being most abundant in years of early spring precipitation.

2. Composition of Potential Plant Community

Approximate percentage of total annual air-dry herbage yield.

Grasses and Grasslike - 70%	
Sand bluestem	12-15
Little bluestem	12-15
Sand dropseed)	
Mesa dropseed)	
Spike dropseed)	12-15
Hairy grama	8-10
Threeawn	5-7
Sand paspalum)	
Sand lovegrass)	
Plains bristlegrass)	4-6
iant sandreed)	
ndian grass)	2-4
Fall witchgrass)	
Hall's panicum)	2-4
Other annual grasses	0-2

(Shrubs, half shrubs, trees and vines) Woody - 20%	
Shinnery oak	0-12
Sand sagebrush	7- 9
Broom snakeweed)	
Groundsel)	1-3
Small soapweed	1-2
Plains rabbitbush	0-2

Forbs - 10%	
Annual Buckwheat	3-5
Annual mustard	2-4
Annual sunflower	2-4
Gaura spp	1-2
Stickleaf)	
Globemallow)	
Ragweed)	2-3
Other annual forbs	3-5
Other perennial forbs	1-3

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	16%
Shrubs and half-shrubs - canopy	14%
Bare ground	50%
Surface gravel	0%
Surface cobble and stones	0%
Litter - percent of area	20%
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 2400 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 1000 pounds per acre during unfavorable years. The average annual productions is 1650 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed any season of the year except during spring when shinnery oak is in the late bud and early leaf stage. During this period of time (normally six weeks) domestic livestock should be removed from pastures with this site because shinnery is toxic. Care must be taken in years of high production of acorns. The acorns are also poisonous and are relished by livestock. Immediately following this stage shinnery provides forage for livestock for about six weeks before the leaf becomes tough and brittle. This site can be grazed by cattle, goats and sheep due to the variety of grasses, forbs and shrubs. However, it is most efficiently utilized by cattle. Continuous, yearlong grazing by cattle results in a plant community of low forage-value plants such as threeawns, field sandbur, shinnery oak, small soapweed, sand sagebrush and forbs. Mesquite will easily invade where there is an available seed source. This condition is usually accompanied by reduced ground cover causing wind erosion. A system of deferred grazing, which varies the season of grazing and rest, is needed to maintain or improve a healthy well-balanced plant community. Rest in different seasons benefits different plants. Winter rest will benefit all woody species. Spring rest will encourage forb production and benefit New Mexico feathergrass. Summer rest (July-September) allows species such as sand bluestem and little bluestem to grow and reproduce. Fall rest allows all warm season species to complete their growth cycle and mature. Shinnery oak can be best utilized if cattle are concentrated into a small pasture immediately following the toxic stage until leaves become tough and brittle.

2. Wood Products

None

3. Habitat for Wildlife

4. Hydrological Interpretations

Group A

Roswell

Approximate hydrologic curve No. when vegetation is at its potential; A Soils - 68.

5. Recreation and Natural Beauty

Recreation potential is limited due to lack of access roads for two-wheel drive vehicles, loose sands, lack of live water and lack of shade. Aesthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. Hunting for prairie chicken is good to excellent. Hunting for antelope is fair to good. Photography of prairie chickens during their "booming" season is excellent to good. The natural beauty is enhanced by the large variety of flowering forbs that bloom from early spring to late fall and the varying color hues of the bluestem species.

6. Endangered Plants and Animals

Lesser Prairie Chicken - Unique

(Other species' names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stock Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.4-3.6	3.4-5.5	5.3-10.0	10.1 +
Unfavorable years	3.4-5.5	5.3-9.2	9.1-12.0	12.1 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
New Mexico feathergrass	Mesa dropseed	Perennial ragweed
Little bluestem	Sand lovegrass	Annual buckwheat
Sand bluestem	Sand dropseed	Stickleaf
Hairy grama	Spike dropseed	Queen's delight
Plains bristlegrass	Threeawns	Wooly gaura
Fall witchgrass	Field sandbur	Annual mustards
Sand paspalum	Snakeweed	Rubberweed
Indiangrass	Sand sagebrush	Groundsel
Plains rabbitbush	Small soapweed	
Annual sunflower	Prickly pear cactus	
Giant sandreed	Shinnery oak	
Hall's panicum	Globemallow	

(b) Antelope

Primary
New Mexico feathergrass
Sand sagebrush

Annual sunflower

Secondary
Little bluestem
Hairy grama
Sand lovegrass
Plains bristlegrass
Small soapweed
Shinnery oak
Plains rabbitbush
Globemallow
Perennial ragweed
Queen's delight
Wooly gaura
Rubberweed
Hall's panicum

Low Value
Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Indian grass
Field sandbur
Snakeweed
Prickly pear cactus
Annual buckwheat
Stickleaf
Annual mustards
Mesa dropweed
Giant sandreed

(c) Horse

Primary
New Mexico feathergrass
Hairy grama
Hall's punicum

Secondary
Little bluestem
Sand Bluestem
Plains bristlegrass
Indian grass
Giant sandreed

Low Value
Sand lovegrass
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Sand sagebrush
Small soapweed
Prickly pear cactus
Shinnery oak
Plains rabbitbush
Globemallow

Perennial ragweed
Annual buckwheat
Annual sunflower
Stickleaf
Queen's delight
Wooly gaura
Annual mustards
Mesa dropseed

(d) Sheep

Primary
Sand sagebrush
Annual sunflower
Hairy grama
Hall's panicum

Secondary
New Mexico feathergrass
Little bluestem
Sand lovegrass
Plains bristlegrass
Indian grass
Plains rabbitbush
Globemallow
Perennial ragweed
Queen's delight
Wooly gaura

Low Value
Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Small soapweed
Prickly pear cactus
Shinnery oak
Sand dropseed
Mesa dropseed
Annual buckwheat
Stickleaf
Annual mustards
Giant sandreed

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices

   Roswell
   Portales
   Fort Sumner

3. Field Office Sample Location:

4. Approved:

State Range Conservationist Date
Regional Range Conservationist Date

DRAFT

X

RANGE SITE DESCRIPTION

Section IIe - Technical Guide

Gyp Uplands CP-2

A. SITE NO. G-70-66

B. PHYSIOGRAPHIC FEATURES

This site is characterized by flat to moderately rolling or evenly sloping terrain. The site may be dissected by drainage channels but slopes do not exceed 15 percent. Elevations range from 4200 to 4800 feet. Exposure varies and is not significant.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from 13 to 16 inches. About seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. These soils are shallow and very shallow over gypsum. The surface layer is loam or silt loam about 8 inches thick. The available water capacity is very low. Permeability is moderate. There are few areas of deeper soils and gypsum outcrop is common.

2. Included soils are:

Holloman

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a grassland dominated by warm season short and mid-grasses. Indicator plants for this site are gyp grama, gyp dropseed and coldenia. Shrubs and forbs make up a minor component of the plant community.

2. Composition of Potential Plant Community

Approximate percentage of total annual air-dry herbage production.

Grasses and Grasslike - 83%	
Black grama	13-15
Gyp grama	13-15
Blue grama	10-14
Gyp dropseed	10-14
Tobosa	8-10
Alkali sacaton	5-7
Sideoats grama Cane bluestem	3-5
Threeawns	3-5
Bush muhly	1-2
Plains bristlegrass	1-2
Fluffgrass	1-2
Sand dropseed	1-2

(Shrubs, half-shurbs, vines and trees) Woody - 5%	
Fourwing saltbush	1-3
Morman tea	1-3
Javalinabush Broom snakeweed Yucca Winterfat Prickly pear	1-3

Forbs - 12%	
Coldenia	4-6
Rayless goldenrod	0-3
Buckwheat	0-3
Locoweed	0-1
Other perennial forbs	1-3
Other annual forbs	2-4

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	15%
Shrubs and half-shrubs - canopy	3%
Bare ground	65%
Surface gravel	10%
Surface cobble and stones	0%
Litter - percent of area	7%
average depth in cm.	2

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 900 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 350 pounds per acre during unfavorable years. The average production is about 600 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed at any season of the year by all classes of livestock, generally without regard to age. This site has limited potential as a grazing resources. This site can be easily damaged by heavy grazing pressure causing a loss in cover and a deterioration of the plant community to gyp grama, gyp dropseed and coldenia to completely dominate. Further deterioration usually takes place which reduces this stand and the loss of soil causing bare gypsum surface. Grazing management should be designed to maintain an adequate plant cover to prevent soil erosion. Due to the site's low potential to produce forage, this site should not be exposed to heavy grazing pressure. A system of deferred grazing by domestic livestock, which varies the season of grazing and rest during successive years, is needed to maintain the plant community. Approximately 70 percent of the annual yield is from species that furnish forage for livestock. This site provides good nutrition to livestock during the winter, but care must be taken not to overgraze during this period.

2. Wood Products

None

3. Habitat for Wildlife

(Upland game birds and antelope. Seasonal use from deer.)

4. Hydrological Interpretations

Group C

Holloman

Approximate hydrologic curve No. when vegetation is at its potential: C Soils - 86.

5. Recreation and Natural Beauty

The recreation potential on this site is limited due to the fragile plant community. Off-road vehicles should be discouraged. Hunting for upland game birds is poor to fair. Rock hunting for gyp crystals, "Pecos Valley Diamonds", is fair to good on areas of gyp outcrops.

6. Endangered Plants and Animals

(Species names to be included as reliable data becomes available)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	6.5-7.5	7.4-9.5	9.4-16.0	16.1+
Unfavorable years	7.4-9.5	9.4-16.0	16.0-32.0	32.0+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

High	Medium	Low Value
Blue grama	Gyp grama	Threeawns
Black grama	Tobosa	Fluffgrass
Sand dropseed	Cane bluestem	Gyp dropseed
Plains bristlegrass		Snakeweed
Sideoats grama		Yucca
Bush muhly		Mormon-tea
Alkali sacaton		Pricklypear cactus
Winterfat		Javalinabush
Fourwing saltbush		Buckwheat
		Coldenia
		Rayless goldenrod
		Locoweed

(b) Antelope

High	Medium	Low Value
Locoweed	Black grama	Gyp grama
	Plains bristlegrass	Sand dropseed
	Alkali sacaton	Tobosa
	Winterfat	Threeawns
	Mormon-tea	Cane bluestem
	Fourwing saltbush	Fluffgrass
	Buckwheat	Sideoats grama
	Blue grama	Bush muhly
		Gyp dropseed
		Snakeweed
		Yucca
		Coldenia
		Pricklypear cactus
		Javalinabush
		Rayless goldenrod

(c) Horse

High
Blue grama
Black grama
Sand dropseed
Plains bristlegrass
Sideoats grama
Bush muhly
Alkali sacaton

Medium
Gyp grama
Tobosa
Fourwing saltbush

Low Value
Threeawns
Cane bluestem
Fluffgrass
Gyp dropseed
Winterfat
Snakeweed
Yucca
Mormon-tea
Pricklypear cactus
Javalinabush
Buckwheat
Coldenia
Rayless goldenrod
Locoweed

(d) Sheep

High Q
Blue grama
Black grama
Plains bristlegrass
Sideoats grama
Bush muhly
Winterfat

Medium
Gyp grama
Sand dropseed
Tobosa
Alkali sacaton
Mormon-tea
Fourwing saltbush

Low Value
Threeawns
Cane bluestem
Fluffgrass
Gyp dropseed
Snakeweed
Yucca
Pricklypear cactus
Javalinabush
Locoweed
Buckwheat
Coldenia
Rayless goldenrod

(e) Deer

High
Winterfat

Medium
Alkali sacaton
Mormon-tea
Fourwing saltbush

Low Value
Blue grama
Gyp grama
Black grama
Sand dropseed
Tobosa
Threeawns
Cane bluestem
Fluffgrass
Plains bristlegrass
Sideoats grama
Bush muhly
Gyp dropseed
Snakeweed
Yucca
Pricklypear cactus
Javalinabush
Buckwheat
Coldenia; Locoweed
Rayless goldenrod

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices:

   Fort Sumner
   Roswell

3. Field Office Sample Location:

4. Approved:

State Range Conservationist	Date	Regional Range Conservationist	Date

RANGE SITE DESCRIPTION

A. SITE NO. G-70-68 Limey CP-2

B. PHYSIOGRAPHIC FEATURES

This site occurs on plains and terraces or adjacent to playa lake beds. Slopes are level to gently undulating, usually less than three percent. Exposure varies and is not significant. Elevation ranges from 3500 feet to 4800 feet.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from 13 to 16 inches. About seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. The soils of this site are deep and well-drained with high lime horizons above 20 inches. The surface layer is fine sandy loam, very fine sandy loam and loam. They are strongly calcareous. The underlying layers may be loam, clay loam or silt loam. The soils have moderate permeability. The available water holding capacity is moderate. The plant-soils-air-water relationship is fair. Because of the rather coarse surface texture and high lime content, the soils are easily windblown if not protected by vegetation or organic residue.

2. Included soils are:

Jal like fine sandy loam (as mapped in Northern Chavez County)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a warm season grassland dominated by short and mid-grasses mixed with shrubs and a variety of forbs. The forb composition fluctuates from year to year depending upon moisture conditions.

2. Composition of Potential Plant Community

(Approximate percentage of total annual air-dry herbage production)

Grasses and Grasslike - 75%	
Blue grama Hairy grama	18-20
Sideoats grama	12-15
Black grama	8-10
Sand dropseed	5-8
New Mexico feathergrass	5-8
Tobosa	3-5
Plains bristlegrass	3-5
Ring muhly Threeawns Wolftail	3-5
Alkali sacaton Vine mesquite Little bluestem Cane bluestem	1-3

(Shrubs, half-shrubs, vines and trees) Woody - 15%	
Small soapweed	3-5
Winterfat	3-5
Fourwing saltbush Morman tea	3-5
Broom snakeweed Wooly groundsel	1-3

Forbs - 10%	
Globemallow Leatherweed croton Hoffman seggia spp.	1-3
Other perennial forbs	3-5
Other annual forbs	3-5

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	20%
Shrubs and half-shrubs - canopy	8%
Bare ground	58%
Surface gravel	--
Surface cobble and stones	--
Litter - percent of area	14%
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 1400 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 500 pounds per acre during unfavorable years. The average annual production is approximately 950 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed any season of the year by all classes and ages of livestock. It is better suited to the cow-calf or yearling due to the large percentage of grass in the potential plant community. The minor portion of the stocking rate could be utilized by sheep or antelope. Continuous grazing yearlong or grazing continually during the period from March to October will result in a decrease of species such as black grama, sideoats grama, New Mexico feathergrass, plains bristlegrass, vine mesquite, little bluestem, winterfat and fourwing saltbush. Species such as blue grama, sand dropseed, ring muhly, threeawn and broom snakeweed will increase. Mesquite and burrograss will invade this site under continuous heavy grazing pressure. Blue grama will form a low dense turf under continuous grazing pressure. A system of deferred grazing by domestic livestock, which varies the season of grazing and rest during successive years, will result in a healthy high forage producing plant community. Fall and winter rest will benefit species such as winterfat and black grama. Cattle show a definite seasonal preference to black grama and usually utilize it heavily during the late winter from January through March. Black grama cures well and is higher in protein than the other dormant grasses during this period. Spring rest (April-June) will allow species such as New Mexico feathergrass to grow and reproduce. Summer rest (July-September) benefits warm season species such as black grama, sideoats grama, blue grama, plains bristlegrass and vine mesquite and allows them to gain vigor and reproduce. Eighty-five (85) percent of the annual production is from species that provide forage for grazing animals.

2. Wood Products

This site produces no significant wood products.

3. Habitat for Wildlife

4. Hydrological Interpretations

Group B

Jal like

Approximate hydrologic curve no. when hydrologic cover is optimum:
B soils - 76.

5. Recreation and Natural Beauty

Recreation potential is limited largely by the lack of live water. It is suitable for camping, hiking and picnicking is fair. The aesthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. The natural beauty is limited due to the high lime soils that limits the variety and abundance of flowering plants. Hunting is fair for small game and upland game birds and is fair hunting for antelope.

6. Endangered Plants and Animals

(Species names to be included as reliable information becomes available.)

H. OTHER PERTINENT INFORMATION

1. Suggested Initial Stocking Rate for Cows - Expressed in Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.6-3.4	3.3-4.5	4.4-6.8	6.4+
Unfavorable years	3.0-4.9	4.8-6.0	5.9-9.2	9.3+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
- Sideoats grama
- Little bluestem
- Black grama
- Vine mesquite
- Winterfat
- Plains bristlegrass
- New Mexico feathergrass

Secondary
- Blue grama
- Hairy grama
- Sand dropseed
- Tobosa
- Small soapweed

Low Value
- Threeawns
- Cane bluestem
- Ring muhly
- Globemallow
- Hoffman seggia spp.
- Morman tea
- Broom snakeweed
- Wooly groundsel

(b) Antelope

Primary
- Globemallow
- Perennial forbs
- Annual forbs

Secondary
- Blue grama
- Hairy grama
- Winterfat
- Plains bristlegrass
- Small soapweed
- New Mexico feathergrass

Low Value
- Sideoats grama
- Little bluestem
- Black grama
- Sand dropseed
- Tobosa
- Threeawns
- Cane bluestem
- Vine mesquite
- Ringmuhly
- Morman tea
- Broom snakeweed
- Wooly groundsel

(c) Horse

Primary	Secondary	Low Value
Sideoats grama	Blue grama	Sand dropseed
Little bluestem	Black grama	Tobosa
Plains bristlegrass	Hairy grama	Threeawns
	Vine mesquite	Cane bluestem
	New Mexico feathergrass	Ring muhly
		Winterfat
		Small soapweed
		Globemallow
		Hoffman seggia spp.
		Morman tea
		Broom snakeweed
		Wooly groundsel

(d) Sheep

Primary	Secondary	Low Value
Sideoats grama	Blue grama	Sand dropseed
Little bluestem	Hairy grama	Tobosa
Black grama	Vine mesquite	Threeawns
Plains bristlegrass	Winterfat	Cane bluestem
	Small soapweed	Ring muhly
	Globemallow	New Mexico feathergrass
	Morman tea	Broom snakeweed
		Wooly groundsel

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices:

   Santa Rosa
   Fort Sumner
   Portales
   Roswell

3. Field Office Sample Location:

4. Approved:

State Range Conservationist ______ Date ______ Regional Range Conservationist ______ Date ______

DRAFT

KWW
4/77

RANGE SITE DESCRIPTION

Section IIe - Technical Guide

A. SITE NO. G-70-52 Loamy CP-2

B. PHYSIOGRAPHIC FEATURES

This site is on nearly level to undulating plains at elevations between approximately 3800 feet to 5000 feet. Slopes are 0 to 9 percent.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from 13-1/2 to 16-1/2 inches. Seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. These are moderately deep and deep well-drained soils on uplands and alluvial fans. The surface layers are silt loam, loam or clay loam. The subsoil and substratum ranges in texture from sandy loam through clay loam. The surface runoff is medium. The permeability is slow to moderately rapid. Infiltration rate is medium to moderately slow.

2. Soils included are:

   Tucumcari loam
   Conchas loam
   Reagan loam
   LaCita loam, eroded
   LaLande loam
   Quay loam
   San Jose loam, eroded

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is dominated by warm-season short and mid-grasses. Forbs are a minor component to this plant community. Few woody species are found in the potential plant community.

2. Composition of Potential Plant Community 1/

Grasses - 77%	
Blue grama	32-35
Galleta	10-12
Tobosa	
Black grama	8-12
Sideoats grama	8-12
Sand dropseed	4-7
Ring muhly	2-4
Threeawn	3-6
Vine mesquite	2-5
Alkali sacaton	5-8
Silver bluestem	2-5
*Western wheatgrass	0-3
Bottlebrush squirreltail	0-3
Buffalograss	0-3
Arizona cottontop	1-4
Fluffgrass	0-1
Little bluestem	2-5

Woody - 6%	
Broom snakeweed	1-3
Yucca	1-3
Winterfat	1-3
Prickly pear	0-1
**Mesquite	0-3

Forbs - 17%	
Globemallow	1-2
Annual sunflower	1-2
Astragulas spp.	0-1
Other annual forbs	3-6
Other perennial forbs	3-6

* In the high range of the precipitation.
** In areas where mesquite has invaded, the potential plant community should include this species.

1/ Approximate percentage of total annual herbage yield expressed in air-dry weight (lbs) per acre.

Ground Cover

	Percent of Surface Area			
	0-30	30-50	50-75	75-100
Grasses and forbs - plant density		33		
Shrubs and half-shrubs - canopy	2			
Bare ground			53	
Surface gravel	--			
Surface cobble and stones	--			
Litter - percent of area avg. depth in cm.	12 3			

TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 1500 air-dry pounds per acre of grasses, forbs, and shrubs in years of favorable growing conditions and about 400 pounds in unfavorable years. The average production is approximately 750 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed any season of the year by all classes and ages of livestock. It is better suited to cow-calf or yearlings due to the large percentage of grass in the potential plant community. Continuous grazing yearlong or grazing continually during the period from March through October, by cattle, will result in a decrease of species such as black grama, sideoats grama, alkali sacaton, vine mesquite, little bluestem, western wheatgrass, bottlebrush squirreltail and winterfat. Species such as blue grama, galleta or tabosa, ring muhly, threeawns and broom snakeweed will increase. Cholla cactus and one-seeded juniper will invade this site under continuous heavy grazing pressure where there is an available seed source from an adjoining site. Blue grama will form a low dense turf under continuous grazing pressure. A system of deferred grazing by domestic livestock which varies the season of grazing and rest during successive years will result in a healthy, high forage producing plant community. Fall and winter rest will benefit species such as winterfat and black grama. Cattle show a definite seasonal preference on black grama and usually utilize it heavily during the late winter from January to March. Black grama cures well and is higher in protein than other grasses during this period. Spring rest (April-June) will allow species such as western wheatgrass and bottlebrush squirreltail to grow and reproduce. Summer rest will benefit warm-season species such as blue grama, sideoats grama, vine mesquite and alkali sacaton to gain vigor and produce. Ninety-five percent (95%) of the annual production is from species that provide forage for grazing animals.

2. Wood Products

None

3. Habitat for Wildlife

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Tucumcari	B
Conchas	B
Reagan	B
La Cita	B
La Lande	B
Quay	B
San Jose	B

Approximate hydrologic curve No. when vegetation is at its potential: B Soils - 79.

5. Recreation and Natural Beauty

Recreation potential is limited largely by the lack of water and firewood. Suitability for camping, hiking and picnicking is fair. Esthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. Hunting is fair for small game and upland game birds and is good hunting for antelope.

6. Endangered Plants and Animals

(Species' names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Suggested Initial Stocking Rate for Cows - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.3-3.0	2.8-4.1	4.0-5.8	5.9+
Unfavorable years	3.3-4.9	4.8-5.9	5.8-9.0	9.0+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
Sideoats grama
Little bluestem
Black grama
Bottlebrush squirreltail
Vine mesquite
Arizona cottontop
Winterfat
Annual sunflower

Secondary
Blue grama
Hairy grama
Sand dropseed
Tobosa
Galleta
Yucca

Low Value
Threeawns
Silver bluestem
Fluffgrass
ring muhly
Prickly pear cactus
Mesquite
Globemallow
Bladderpod
Paintbrush
Astragulas spp
Perennial ragweed
Annual buckwheat
Silverleaf nightshade

(b) Antelope

Primary
Globemallow
Annual sunflower

Secondary
Blue grama
Hairy grama
Winterfat
Yucca
Bladderpod
Paintbrush
Astragulas spp
Perennial ragweed
Annual buckwheat

Low Value
Sideoats grama
Little bluestem
Black grama
Bottlebrush squirreltail
Sand dropseed
Tobosa
Threeawns
Silver bluestem
Vine mesquite
Arizona cottontop
Fluffgrass
Ring muhly
Galleta
Prickly pear cactus
Mesquite
Silverleaf nightshade

(c) Horse

Primary	Secondary	Low Value
Sideoats grama	Blue grama	Sand dropseed
Little bluestem	Black grama	Tobosa
	Bottlebrush squirreltail	Threeawns
	Hairy grama	Silver bluestem
	Vine mesquite	Fluffgrass
	Arizona cottontop	Ring muhly
		Galleta
		Winterfat
		Yucca
		Prickly pear cactus
		Mesquite
		Globemallow
		Bladderpod
		Paintbrush
		Astragulas spp
		Perennial ragweed
		Annual buckwheat
		Silverleaf nightshade
		Annual sunflower

(d) Sheep

Primary	Secondary	Low Value
Sideoats grama	Blue grama	Sand dropseed
Little bluestem	Bottlebrush squirreltail	Tobosa
Black grama	Hairy grama	Threeawns
	Vine mesquite	Silver bluestem
	Arizona cottontop	Fluffgrass
	Winterfat	Ring muhly
	Yucca	Galleta
	Globemallow	Prickly pear cactus
	Bladderpod	Mesquite
	Paintbrush	Astragulas spp
	Annual buckwheat	Perennial ragweed
	Annual sunflower	Silverleaf nightshade

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices:

   Tucumcari
   Las Vegas
   Santa Rosa
   Ft. Sumner
   Portales

3. Field Office Sample Location:

4. Approved:

______________________________ ______________
State Range Conservationist Date

______________________________ ______________
Regional Range Conservationist Date

DRAFT

X

JUL

RANGE SITE DESCRIPTION

Section IIe, Technical Guide

A. SITE NO G-70-61 Sandhills CP-2

B. PHYSIOGRAPHIC FEATURES

1. This site occurs on coarse textured aeolian and alluvial sediments on the upland plains. The landscape is typically a complex of vegetated sand ridges and sand swales. The ridges tend to arrange themselves in a chain extending parallel in the direction of the prevailing winds. The sand ridges generally extend to a tip then collapse causing this side to be concave on the leeward side and the windward side generally convex.

Slopes range from gently sloping to hilly. Slopes are complex and range from 1 to 25 percent. Exposure varies and is generally not significant.

Elevation ranges from about 3500 to 4200 feet.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from about 13-1/2 to 16-1/2 inches. Seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. The soils of this site are deep and excessively drained. The surface textures are fine sand or loamy fine sand and extends to a depth of 60 inches or more. The soils have rapid permeability. Available water capacity is low. The plant-soil-air-water relationship is fair. Becuase of the coarse textures and rapid drying of the surface, the soil, if unprotected by plant cover and organic residue, becomes wind blown and converts rapidly to unstabilized dunes.

2. Included soils are:

Roswell fine sand
Tivoli fine sand
Tivoli loamy fine sand

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is grassland dominated by warm season tall and mid-grasses. Short grasses, shrubs, half-shrubs, perennial and annual forbs make up the remainder of the plant community. Forbs generally fluctuate greatly from year to year, being most abundant in years of early spring precipitation. Forbs and woody species are evenly distributed.

2. Composition of Potential Plant Community

Approximate percentage of total annual air-dry herbage yield.

		(Shrubs, half shrubs vines and trees)			
Grasses & Grasslike - 70%		Woody - 18%		Forbs - 5%	
Sand bluestem	16-20	Shinnery	0-10	Annual sunflower	2-4
Sand dropseed)		Sand sagebrush	5- 7	Annual buckwheat	2-4
Mesa dropseed)		Plains rabbitbush	1-3	Annual mustard	2-4
Spike dropseed)	10-12	Small soapweed	0- 2	Gaura spp	1-2
Little bluestem	8-10	Broom snakeweed)		Rubberweed	1-2
Giant sandreed	5- 7	Groundsel)		Stickleaf)	
Indian grass	4- 6	Prickley pear)	0- 3	Globemallow)	
Sand paspalum)				Perennial ragweed)	1-2
Sand lovegrass)	3- 5			Other annual forbs	2-4
Plains bristlegrass	3- 5			Other perennial forbs	2-4
Hairy grama	3- 5				
Threeawn	2- 4				
Field sandbur	0- 2				
Fall witchgrass)					
Hall's panicum)	2- 4				
Other annual grasses	0 -2				

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	14%
Shrubs and half-shrubs - canopy	12%
Bare ground	56%
Surface gravel	0
Surface cobble and stones	0
Litter - percent of area	18%
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 2200 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 900 pounds per acre during unfavorable years. The average annual production is 1500 pounds per acre.

G. SITE INTERPRETATIONS

1. This site can be grazed any season of the year except during spring when shinnery oak is in the late bud and early leaf stage. During this period of time (normally six weeks) domestic livestock should be removed from pastures with this site because shinnery is toxic. Care must be taken in years of high production of acorns. The acorns are also poisonous and are relished by livestock. Immediately following this stage shinnery provides forage for livestock for about six weeks before the leaf becomes tough and brittle. This site can be grazed by cattle, goats and sheep due to the variety of grasses, forbs and shrubs. However, it is most efficiently utilized by cattle. Continous, yearlong grazing by cattle results in a plant community of low forage-value plants such as threeawns, field sandbur, shinnery oak, small soapweed, sand sagebrush and forbs. This condition is usually accompanied by reduced ground cover causing wind erosion. A system of deferred grazing, which varies the season of grazing and rest, is needed to maintain or improve a healthy well-balanced plant community. Rest in different seasons benefits different plants. Winter rest will benefit all woody species. Spring rest will encourage forb production and benefit New Mexico feathergrass. Summer rest (July-September) allows species such as sand bluestem and little bluestem to grow and reproduce. Fall rest allows all warm season species to complete their growth cycle and mature. Shinnery oak can be best utilized if cattle are concentrated into a small pasture immediately following the toxic stage, until leaves becom tough and brittle.

2. Wood Products

None

3. Habitat for Wildlife

4. Hydrological Interpretations

Group A

Roswell
Tivoli

Approximate hydrologic curve No. when vegetation is at its potential:
A Soils - 68.

5. Recreation and Natural Beauty

Recreation potential is limited due to lack of access roads for two-wheel drive vehicles, loose sands, lack of live water and lack of shade. Aesthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. Hunting for prairie chicken is good to excellent. Hunting for antelope is fair to good. Photography of prairie chickens during their "booming" season is excellent to good. The natural beauty is enhanced by the large variety of flowering forbs that bloom from early spring to late fall and the varying color hues of the bluestem species.

6. Endangered Plants and Animals

Lesser Prairie Chicken - Unique

(Other species' names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stock Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.3-3.7	3.5-5.5	5.3-6.7	6.8+
Unfavorable years	3.5-5.5	5.3-6.7	6.7-12.0	12.0+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
New Mexico feathergrass	Mesa dropseed	Perennial ragweed
Little bluestem	Sand lovegrass	Annual buckwheat
Sand bluestem	Sand dropseed	Stickleaf
Hairy grama	Spike dropseed	Queen's delight
Plains bristlegrass	Threeawns	Wooly gaura
Fall witchgrass	Field sandbur	Annual mustards
Sand paspalum	Snakeweed	Dalea
Indiangrass	Sand sagebrush	Milk spurge
Plains rabbitbush	Small soapweed	Rubberweed
Annual sunflower	Prickly pear cactus	Groundsel
Giant sandreed	Shinnery oak	
Hall's panicum	Globemallow	

(b) Antelope

Primary

New Mexico feathergrass
Sand sagebrush
Astragulas spp
Annual sunflower

Secondary

Little bluestem
Hairy grama
Sand lovegrass
Plains bristlegrass
Small soapweed
Shinnery oak
Plains rabbitbush
Globemallow
Perennial ragweed
Queen's delight
Wooly gaura
Rubberweed
Hall's panicum

Low Value

Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Indian grass
Field sandbur
Snakeweed
Prickly pear cactus
Annual buckwheat
Stickleaf
Annual mustards
Mesa dropseed
Giant sandreed

(c) Horse

Primary

New Mexico feathergrass
Hairy grama
Hall's panicum

Secondary

Little bluestem
Sand bluestem
Plains bristlegrass
Indian grass
Giant sandreed

Low Value

Sand lovegrass
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Sand sagebrush
Small soapweed
Prickly pear cactus
Shinnery Oak
Plains rabbitbush
Globemallow
Astragulas spp
Perennial ragweed
Annual buckwheat
Annual sunflower
Stickleaf
Queen's delight
Wooly gaura
Annual mustards
Mesa dropseed

(d) Sheep

Primary
Sand sagebrush
Annual sunflower
Hairy grama
Hall's panicum

Secondary
New Mexico feathergrass
Little bluestem
Sand lovegrass
Plains bristlegrass
Indian grass
Plains rabbitbush
Globemallow
Perennial ragweed
Queen's delight
Wooly gaura

Low Value
Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Small soapweed
Prickly pear cactus
Shinnery oak
Sand dropseed
Mesa dropseed
Annual buckwheat
Stickleaf
Annual mustards
Giant sandreed

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices

   Roswell
   Portales
1 Fort Sumner

3. Field Office Sample Location

4. Approved:

State Range Conservationist Date   Regional Range Conservationist Date

5/77

RANGE SITE DESCRIPTION

SECTION IIe - Technical Guide

Sandy loam CP-2

A. SITE NO. G-70-54

B. PHYSIOGRAPHIC FEATURES

This site occurs on level to gently sloping areas of the plains upland. It ranges in elevation from approximately 3600 feet to about 5,500 feet. Slopes range from 0 to 8 percent. Exposure varies and is not significant.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from about 13-1/2 to 16-1/2 inches. Seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. This site consists of soils that are deep and well-drained. The surface layer is fine sandy loam about 6 to 18 inches thick. The subsoil is medium and moderately fine textured. They are argillic or cambic horizons and may overlie calcic horizons. These soils have medium to high intake rates and a good water holding characteristic. The air-water-plant relationship is favorable for plant growth. The ability of these soils to absorb moisture quickly makes them more responsive to light or erratic rainfall than adjacent sites having heavier textured surface layers.

2. Included soils are:

Canez fine sandy loam
Redona fine sandy loam
Ratliff fine sandy loam
Faskin fine sandy loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a grassland with a mixture of warm season short and mid-grasses dotted with an occasional half-shrub. Perennial and annual forbs make up approximately 15% of the plant community. Half-shrubs make up a minor portion of the community.

2. Composition of Potential Plant Community (Approximate percentage of total annual herbage yield expressed in air-dry weight (lbs) per acre.)

Grasses - 80%	
Little bluestem	10-13
Sideoats grama	15-17
Blue grama)	20-25
Hairy grama)	
Black grama	15-17
Plains bristlegrass	5-7
Sand dropseed	3-5
Red lovegrass	3-5
Fall witchgrass	0-2
Sand muhly	0-2
New Mexico feathergrass	0-2
Threeawns	3-5
Arizona cottontop	2-4

Woody - 6%	
Yucca	3-5
Broom snakeweed	1-3
Winterfat	0-2
Morman tea	0-2
Sand sage)	0-2
Prickly pear)	
Wooly groundsel)	
*Mesquite	0-2

Forbs - 14%	
Globemallow	2-4
Indian rushpea	1-3
Croton	1-3
Annual buckwheat)	1-3
Stickleaf)	
Dalea)	
Other perennial forbs	3-5
Other annual forbs	3-5

*In areas where mesquite has invaded, the potential plant community should include this species.

. Ground Cover

	Percent of Surface Area			
	0-30	30-50	50-75	75-100
Grasses and forbs - plant density	25			
Shrubs and half-shrubs - canopy	5			
Bare ground			55	
Surface gravel	--			
Surface cobble and stones	--			
Litter - percent of area avg. depth in cm.	10 > 3			

F. TOTAL ANNUAL HERBAGE PRODUCTION

e potential plant community produces approximately 1600 air-dry pounds per acre of grasses, forbs and shrubs in years of favorable growing conditions and about 450 pounds in unfavorable years. The average production is approximately 950 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed by all classes and kinds of livestock during any season of the year. Approximately 95% of the total yield is from species that furnish forage for grazing animals. These species are a large variety of grasses and forbs which provide good forage and nutrition for grazing animals during most of the year. Supplemental protein is needed during the winter months. Due to the potential of this site to produce forbs, it may favor grazing by sheep and antelope. Continuous yearlong grazing by cattle or continual grazing during the period from April through October will cause the site to deteriorate and become less productive. Species such as little bluestem, sideoats grama, black grama, plains bristlegrass, New Mexico feathergrass and winterfat will decrease in composition of the plant community. Species such as blue grama, sand dropseed, threeawns, yucca and broom snakeweed will increase under continual grazing. Mesquite will easily invade this site under deteriorated conditions. A system of deferred grazing, which varies the season of rest and grazing during successive years, is needed to maintain or improve a healthy well-balanced plant community. Deferment during different seasons of the year benefits different species. Rest during the winter benefits winterfat. Also, cattle show a definite preference to black grama during the late winter and can be over utilized. Winter rest will reduce the grazing pressure on black grama. Spring rest (April-June) will benefit cool season grasses such as New Mexico feathergrass and early forbs. Summer rest will benefit warm season species such as little bluestem, sideoats grama, black grama and blue grama. Fall rest will allow the warm season plants to complete their growth cycle and mature.

2. Wood Products

None

3. Habitat for Wildlife

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Canez	B
Faskin	B
Ima	B
Ratliff	B
Redona	B

Approximate hydrologic curve No. when vegetation is at its potential: B Soils - 79

5. Recreation and Natural Beauty

Recreation potential is limited. Suitability for camping, picnicking, and hiking is fair, limited mainly by live water and the lack of shade. Hunting is good for antelope, quail, dove, and small game. Esthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. The natural beauty of this site is enchanced by the large variety of flowering plants that bloom from early spring to late fall with the availability of precipitation.

6. Endangered Plants and Animals

(Species' names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.0-2.7	2.6-3.9	3.8-6.4	6.5+
Unfavorable years	3.6-4.3	4.2-5.5	5.4-8.0	8.0+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
- Sideoats grama
- New Mexico feathergrass
- Little bluestem
- Black grama
- Bottlebrush squirreltail
- Plains bristlegrass
- Arizona cottontop
- Winterfat
- Annual sunflower

Secondary
- Blue grama
- Hairy grama
- Sand dropseed
- Fall witchgrass
- Red lovegrass
- Globemallow
- Croton

Low Value
- Threeawns
- Sand muhly
- Snakeweed
- Sand sage
- Yucca
- Morman tea
- Prickly pear cactus
- Wooly groundsel
- Mesquite
- Bladderpod
- Astragulas spp
- Plains blackfoot
- Perennial ragweed
- Annual buckwheat
- Silverleaf nightshade
- Stickleaf
- Dalea
- Indian rushpea

(b) Antelope

Primary
- Annual sunflower
- Croton

Secondary
- Blue grama
- New Mexico feathergrass
- Black grama
- Bottlebrush squirreltail
- Hairy grama
- Arizona cottontop
- Winterfat
- Globemallow
- Bladderpod
- Astragulas spp
- Plains blackfoot
- Perennial ragweed
- Annual buckwheat
- Stickleaf
- Dalea
- Indian rushpea

Low Value
- Sideoats grama
- Little bluestem
- Sand dropseed
- Threeawns
- Plains bristlegrass
- Fall witchgrass
- Red lovegrass
- Sand muhly
- Snakeweed
- Sand sage
- Yucca
- Morman tea
- Prickly pear cactus
- Wooly groundsel
- Mesquite
- Silverleaf nightshade

(c) Horse

Primary	Secondary	Low Value
Blue grama	Little bluestem	Sand dropseed
Sideoats grama	Bottlebrush squirreltail	Threeawns
New Mexico feathergrass	Hairy grama	Fall witchgrass
Black grama	Plains bristlegrass	Red lovegrass
	Arizona cottontop	Sand muhly
		Winterfat
		Snakeweed
		Sand sage
		Yucca
		Morman tea
		Prickly pear cactus
		Wooly groundsel
		Mesquite
		Globemallow
		Bladderpod
		Astragulas spp
		Plains blackfoot
		Perennial ragweed
		Annual buckwheat
		Silverleaf nightshade
		Annual sunflower
		Stickleaf
		Croton
		Dalea
		Indian rushpea

(d) Sheep

Primary	Secondary	Low Value
	Blue grama	New Mexico feathergrass
	Sideoats grama	Little bluestem
	Black grama	Sand dropseed
	Bottlebrush squirreltail	Threeawns
	Hairy grama	Fall witchgrass
	Plains bristlegrass	Arizona cottontop
	Winterfat	Red lovegrass
	Sand sage	Sand muhly
	Globemallow	Snakeweed
	Bladderpod	Yucca
	Plains blackfoot	Morman tea
	Perennial ragweed	Prickly pear cactus
	Annual sunflower	Wooly groundsel
	Stickleaf	Mesquite
	Croton	Astragulas spp
	Dalea	Annual buckwheat
	Indian rushpea	Silverleaf nightshade

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices

   Las Vegas
   Mora

3. Field Office Sample Location

4. Approved

State Range Conservationist	Date	Regional Range Conservationist	Date

DRAFT

X

RANGE SITE DESCRIPTION

Section IIe - Technical Guide

A. SITE NO. G-70-55　　　　Sandy Plains CP-2

B. PHYSIOGRAPHIC FEATURES

This site occurs on level to gently undulating sloping aeolian and alluvial sediments on the uplands. Elevation ranges from 3500 feet to 4800 feet. Slopes range from 0 to 5 percent. Exposure varies and is not significant.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from about 13-1/2 to 16-1/2 inches. Seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. The soils of this site are deep and well-drained. The surface textures are fine sand or loamy fine sand from 8 to 36 inches thick. The textures of the argillic subsoil is sandy clay loam, fine sandy loam or loamy fine sand. In some soils, a calcic horizon occurs at a depth of 20 to 60 inches. The soils have moderately rapid or moderate permeability. The available water capacity is moderate or high. The plant-soil-air-water relationship is good. Because of the coarse surface textures, the soils, if unprotected by plant cover and organic residue, becomes wind blown and low hummocks or dunes are formed around shrubs.

2. Included soils are:

Jalmar fine sand
Pyote fine sand
Malstrom like fine sand
Faskin fine sand
Faskin loamy fine sand
Redona loamy fine sand
Canez loamy fine sand
Ima loamy fine sand

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a warm season grassland dominated by mid and tall grasses mixed with shrubs and a variety of forbs. The forb composition fluctuates from year to year depending upon moisture conditions.

2. Composition of Potential Plant Community (Approximate percentage of total annual herbage yield expressed in air-dry weight (lbs) per acre.)

Grasses-Grasslike 68%	
Sand bluestem	10-12
Little bluestem	15-20
Sand paspalum)	3-5
Red lovegrass)	
Plains bristlegrass	3-5
Hairy grama	3-5
Threeawns	3-5
Fall witchgrass	3-5
Sand dropseed	7-10
New Mexico feathergrass	6-8
Black grama	3-5
Indiangrass	3-5
Spike dropseed	3-5
Sideoats grama	3-5
Other annual grasses	0-2
Field sandbur	0-1

Woody-shrubs, half-shrubs, vines and bushes - 17%	
Shinnery oak	0-12
Small soapweed	3-5
Morman tea	0-2
Broom snakeweed	1-2
Sand sagebrush	5-7
Plains rabbitbush	1-3
Prickly pear	0-1

Forbs - 15%	
Queens delight	1-3
Globemallow)	1-3
Annual buckwheat)	
Annual sunflower)	
Western ragweed)	0-2
Stickleaf)	
Wooly gaura)	
Annual mustards)	
Dalea)	
Milky spurge)	
Other annual forbs	2-4
Other perennial forbs	2-4

Ground Cover

	Percent of Surface Area			
	0-30	30-50	50-75	75-100
Grasses and forbs - plant density	25			
Shrubs and half-shrubs - canopy	18			
Bare ground		47		
Surface gravel	--			
Surface cobble and stones	--			
Litter - percent of area avg. depth in cm.	10 4			

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 2500 air-dry pounds per acre of grasses, forbs and shrubs in years of favorable growing conditions and about 1000 pounds in unfavorable years. The average production is approximately 1800 pounds per acre.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed any season of the year except during spring when shinnery oak is in the late bud and early leaf stage. During this period of time (normally six weeks) domestic livestock should be removed from pastures with this site because shinnery is toxic. Care must be taken in years of high production of acorns. The acorns are also poisonous and are relished by livestock. Immediately following this stage shinnery provides forage for livestock for about six weeks before the leaf becomes tough and brittle. This site can be grazed by cattle, goats and sheep due to the variety of grasses, forbs and shrubs. However, it is most efficiently utilized by cattle. Continuous, yearlong grazing by cattle results in a plant community of low forage-value plants such as threeawns, field sandbur, shinnery oak, small soapweed, sand sagebrush and forbs. Mesquite will easily invade where there is an available seed source. This condition is usually accompanied by reduced ground cover causing wind erosion. A system of deferred grazing which varies the season of grazing and rest, is needed to maintain or improve a healthy well-balanced plant community. Rest in different seasons benefits different plants. Winter rest will benefit all woody species. Spring rest will encourage forb production and benefit New Mexico feathergrass. Summer rest (July-September) allows species such as sand bluestem, little bluestem to grow and reproduce. Fall rest allows all warm season species to complete their growth cycle and mature. Shinnery oak can be best utilized if cattle are concentrated into a small pasture immediately following the toxic stage.

2. Wood Products

None

3. Habitat for Wildlife

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Jalmar	A
Pyote	B
Malstrom	B
Redona	B
Faskin	B
Canez	B
Ima	B

Approximate hydrologic curve No. when vegetation is at its potential:
A Soils - 68; B Soils - 79.

5. Recreation and Natural Beauty

Recreation potential is limited due to lack of access roads for two-wheel drive vehicles, loose sands, lack of live water and lack of shade. Aesthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. Hunting for prairie chicken is good to excellent. Hunting for antelope is fair to good. Photography of prairie chickens during their "booming" season is excellent to good. The natural beauty is enhanced by the large variety of flowering forbs that bloom from early spring to late fall and the varying color hues of the bluestem species.

6. Endangered Plants and Animals

Lesser Prairie Chicken - Unique

(Other species' names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stock Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.1-2.7	2.6-4.3	4.3-6.8	6.8+
Unfavorable years	3.0-4.3	4.2-6.8	6.7-9.0	9.0+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
Sideoats grama
New Mexico feathergrass
Little bluestem
Black grama
Sand bluestem
Hairy grama
Plains bristlegrass
Fall witchgrass
Sand paspalum
Indiangrass
Plains rabbitbush
Annual sunflower

Secondary
Blue grama
Red lovegrass
Sand dropseed
Spike dropseed
Threeawns
Field sandbur
Snakeweed
Sand sagebrush
Small soapweed
Morman tea
Prickly pear cactus
Shinnery oak
Globemallow

Low Value
Astragulas spp
Perennial ragweed
Annual buckwheat
Stickleaf
Queen's delight
Wooly gara
Annual mustards
Dalea
Milk spurge

(b) Antelope

Primary
New Mexico feathergrass
Black grama
Sand sagebrush
Astragulas spp
Annual sunflower

Secondary
Blue grama
Little bluestem
Hairy grama
Red lovegrass
Plains bristlegrass
Small soapweed
Shinnery oak
Plains rabbitbush
Globemallow
Perennial ragweed
Queen's delight
Wooly gara

Low Value
Sideoats grama
Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Indian grass
Field sandbur
Sankeweed
Morman tea
Prickly pear cactus
Annual buckwheat
Stickleaf
Annual mustards
Dalea
Milk spurge

(c) Horse

Primary
Blue grama
Sideoats grama
New Mexico feathergrass
Black grama
Hairy grama

Secondary
Little bluestem
Sand bluestem
Plains bristlegrass
Indian grass

Low Value
Red lovegrass
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Sand sagebrush
Small soapweed
Morman tea
Prickly pear cactus
Shinnery Oak
Plains rabbitbush
Globemallow
Astragulas spp
Perennial ragweed
Annual buckwheat
Annual sunflower
Stickleaf
Queen's delight
Wooly gara
Annual mustards
Dalea
Milk spurge

(d) Sheep

Primary
Sand sagebrush

Secondary
Blue grama
Sideoats grama
New Mexico feathergrass
Little bluestem
Black grama
Hairy grama
Red lovegrass
Plains bristlegrass
Indian grass
Plains rabbitbush

Low Value
Sand bluestem
Sand dropseed
Spike dropseed
Threeawns
Fall witchgrass
Sand paspalum
Field sandbur
Snakeweed
Small soapweed
Morman tea
Prickly pear cactus
Shinnery oak

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices

   Fort Sumner
   Portales

3. Field Office Sample Location

4. Approved:

State Range Conservationist	Date	Regional Range Conservationist	Date

DRAFT

X

RANGE SITE DESCRIPTION

Section IIe - Technical Guide

Shallow Sand CP-2

A. SITE NO. G-70-62

B. PHYSIOGRAPHIC FEATURES

This site is on nearly level to gently undulating soils of the upland. Slopes range from 0 to 5 percent. Exposure varies and is not significant. Elevation ranges from about 4400 to 6000 feet.

C. CLIMATIC FEATURES

The climate of this area can be classified as "semi-arid continental".

1. Annual average precipitation ranges from 13 to 16 inches. About seventy-eight percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thundershowers. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

2. Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90° from July to August and an average summer includes about 80 days with high readings exceeding 90° and 10 days with reading above 100°. Temperatures usually fall rapidly after sundown and low 60's on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

3. The freeze-free season ranges from 190 to 197 days. Dates of the last freeze are April 11 to April 17 and the first freeze varies from October 20 to October 25.

4. Both temperature and rainfall distribution favor warm-season, perennial plant communities in this area. However, sufficient late winter and early spring moisture allows a cool-season species to occupy a minor component within the plant community.

D. SOILS

1. The soils are well-drained, shallow and very shallow over hard caliche. The surface texture is sandy loam or loamy sand 6 to 20 inches thick. Permeability is rapid. The available water capacity is very low. The plant-soil-water-air relationship is good.

2. Included soils are:

Blakney fine sandy loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site is a grassland dominated by warm season mid and short grasses dotted with shrubs and half-shrubs. Forbs and woody species make up less than 20 percent of the plant community and are evenly distributed. Cool-season grasses and forbs make up a minor component of the community.

2. Composition of Potential Plant Community

Approximate percentage of total annual air-dry herbage production.

Grasses and Grasslike - 82%	
Blue grama	)
Hairy grama	)20-22
Black grama	17-19
Sideoats grama	15-17
Little bluestem	5-7
~~Hairy grama~~	~~5-7~~
New Mexico feathergrass	6-8
Sand dropseed	3-5
Threeawn	) 2-4
Sand muhly	)
Plains bristlegrass	1-3
Arizona cottontop	0-2

(Shrubs, half-shrubs, vines and trees) Woody - 8%	
Small soapweed	3-5
Skunkbush sumac	0-4
Catclaw acacia	0-2
Winterfat	1-2
Broom snakeweed)	
Groundsel)	1-2
Mesquite*	0-2

Forbs - 10%	
Wooly Indian wheat	) 3-5
Leather croton	)
Verbena	)
Globemallow	)
Annual buckwheat	)
Annual mustard	) 2-4
Loco weed	0-2
Other perennial forbs	2-4
Other annual forbs	2-4

* In areas where mesquite has invaded, the potential plant community should include this species.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	25%
Shrubs and half-shrubs - canopy	5%
Bare ground	55%
Surface gravel	0%
Surface cobble and stones	0%
Litter - percent of area	15%
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION

The potential plant community produces approximately 1400 pounds per acre of air-dry grasses, shrubs and forbs during years of favorable growing conditions and about 450 pounds per acre during unfavorable years. The average production is about 850 pounds.

G. SITE INTERPRETATIONS

1. Grazing

This site can be grazed by all classes and kinds of livestock during any season of the year. Approximately 90% of the total yield is from species that furnish forage for grazing animals. These species are a large variety of grasses and forbs which provide good forage and nutrition for grazing animals during most of the year. Supplemental protein is needed during the winter months. Due to the potential of this site to produce forbs, it may favor grazing by sheep and antelope. Continuous yearlong grazing by cattle or continual grazing during the period from April through October will cause the site to deteriorate and become less productive. Species such as little bluestem, sideoats grama, black grama, plains bristlegrass, New Mexico feathergrass and winterfat will decrease in composition of the plant community. Species such as blue grama, sand dropseed, threeawns, yucca and broom snakeweed will increase under deteriorated conditions. A system of deferred grazing, which varies the season of rest and grazing during successive years, is needed to maintain or improve a healthy well-balanced plant community. Deferment during different seasons of the year benefits different species. Rest during the winter benefits winterfat. Also, cattle show a definite preference to black grama during the late winter and it can be over utilized. Winter rest will reduce the grazing pressure on black grama. Spring rest (April-June) will benefit cool season grasses such as New Mexico feathergrass and early forbs. Summer rest will benefit warm season species such as little bluestem, sideoats grama, black grama and blue grama. Fall rest will allow the warm season plants to complete their growth cycle and mature.

2. Wood Products

None

3. Habitat for Wildlife

(Good-antelope)

4. Hydrological Interpretations

Group C

Blakney

Approximate hydrologic curve No. when vegetation is at its potential: C Soils - 86.

5. Recreation and Natural Beauty

Recreation potential is limited. Suitability for camping, picnicking, and hiking is fair, limited mainly by live water and the lack of shade. Hunting is good for antelope, quail, dove and small game. Esthetic appeal is enhanced by the terrain typical of the "wide open spaces" of the area. The natural beauty of this site is enhanced by the large variety of flowering plants that bloom from early spring to late fall with the availability of precipitation.

6. Endangered Plants and Animals

(Species names to be included as reliable data becomes available.)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate - Acres per Animal Unit Month

	Excellent	Good	Fair	Poor
Favorable years	2.4-3.2	3.1-4.1	4.0-6.9	7.0+
Unfavorable years	3.1-4.1	4.0-6.5	6.9-9.0	9.1+

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
- Sideoats grama
- New Mexico feathergrass
- Little bluestem
- Black grama
- Plains bristlegrass
- Arizona cottontop
- Winterfat

Secondary
- Blue grama
- Hairy grama
- Sand dropseed
- Globemallow
- Croton

Low Value
- Threeawns
- Sand muhly
- Snakeweed
- Sand sage
- Small soapweed
- Mesquite
- Groundsel
- Annual mustard
- Astragulas spp
- Annual buckwheat
- Stickleaf
- Dalea
- Indian rushpea
- Skunkbush sumac
- Catclaw acacia

(b) Antelope

Primary
Croton
Astragulas spp.
Annual forbs
Perennial forbs

Secondary
Blue grama
New Mexico feathergrass
Black grama
Hairy grama
Arizona cottontop
Winterfat
Globemallow
Annual mustard

Annual buckwheat
Stickleaf
Dalea
Indian rushpea

Low Value
Sideoats grama
Little bluestem
Sand dropseed
Threeawns
Plains bristlegrass
Sand muhly
Snakeweed
Sand sage
Groundsel
Mesquite
Skunkbush sumac
Catclaw acacia

(c) Horse

Primary
Blue grama
Sideoats grama
New Mexico feathergrass
Black grama

Secondary
Little bluestem
Hairy grama
Plains bristlegrass
Arizona cottontop

Low Value
Sand dropseed
Threeawns
Sand muhly
Winterfat
Snakeweed
Sand sage
Small soapweed
Groundsel
Mesquite
Globemallow
Annual mustard
Astragulas spp
Annual buckwheat
Stickleaf
Croton
Dalea
Indian rushpea
Skunkbush sumac
Catclaw acacia

(d) Sheep

Primary	Secondary	Low Value
Annual forbs	Blue grama	New Mexico feathergrass
Perennial forbs	Sideoats grama	Little bluestem
	Black grama	Sand dropseed
	Hairy grama	Threeawns
	Plains bristlegrass	Arizona cottontop
	Winterfat	Sand muhly
	Sand sage	Snakeweed
	Globemallow	Small soapweed
	Annual mustard	Groundsel
	Stickleaf	Mesquite
	Croton	Astragulas spp
	Dalea	Annual buckwheat
	Indian rushpea	Skunkbush sumac
		Catclaw acacia

I. IDENTIFICATION AND AUTHORIZATION

1. USDA SCS
   Albuquerque, NM
   MLRA 70

2. Field Offices

   Fort Sumner
   Santa Rosa
   Portales

3. Field Office Sample Location

4. Aprpoved:

State Range Conservationist Date

Regional Range Conservationist Date

RANGE SITE DESCRIPTION
Section IIe, Technical Guide

A. SITE NO. HP-77-53-TxN

Loamy HP-3

B. PHYSIOGRAPHIC FEATURES

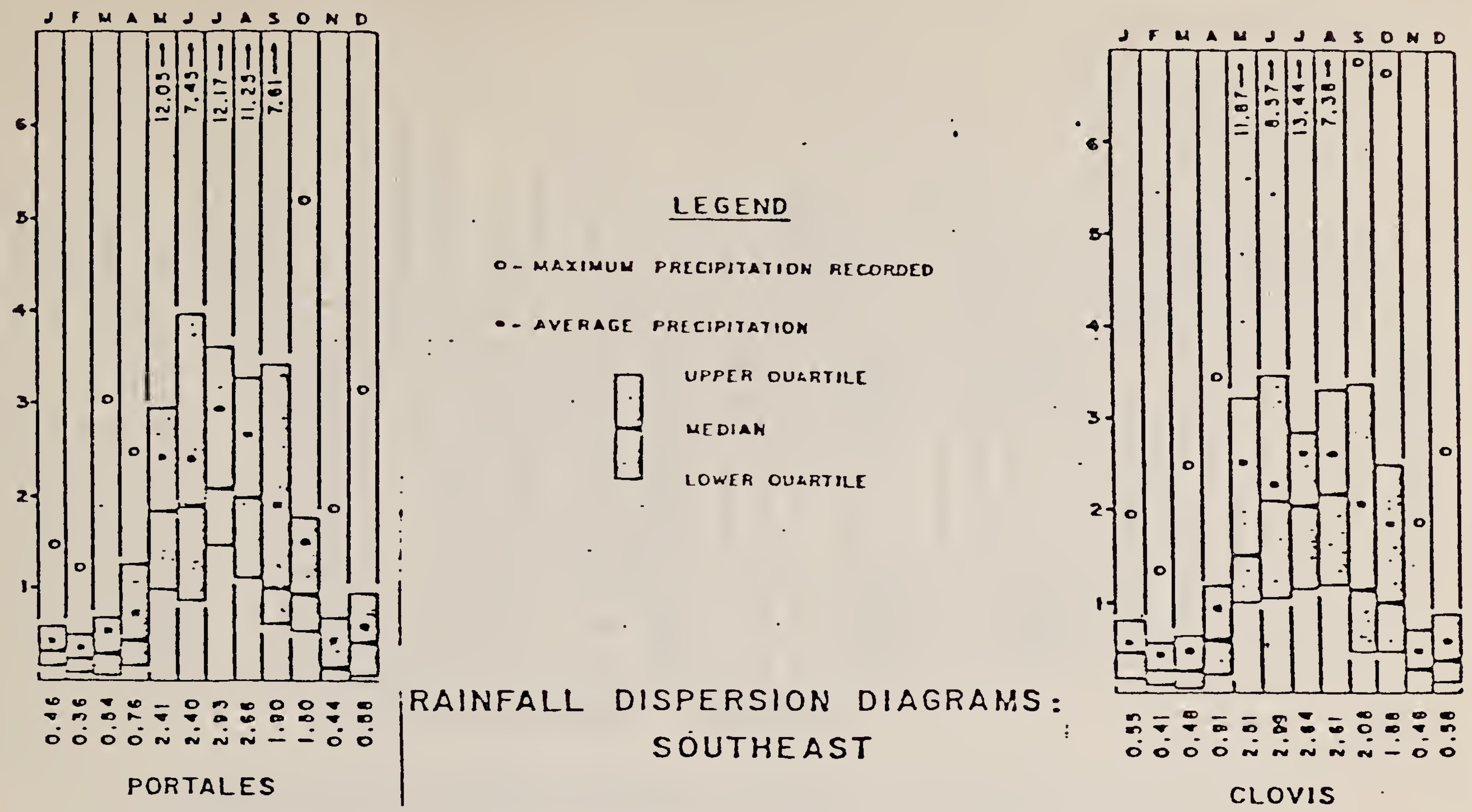
1. This site occurs on nearly level to gently sloping upland plains and footslopes of breaks and low ridges, namely the high plains of southeastern New Mexico and adjacent west Texas. It may occur on both convex and concave or slightly depressed positions in the landscape.
2. Slopes range from 0 to 5 percent typically, but may be as high as 15 percent on footslopes. Direction of slope varies and is not significant.
3. Elevations range from 3550 feet to 4300 feet.

C. CLIMATIC FEATURES

The climate of this area is classified as semi-arid continental, characterized by warm summers, cool, dry winters, and abundant sunshine. About 75 percent of the possible sunshine is received throughout the year.

C. CLIMATIC FEATURES

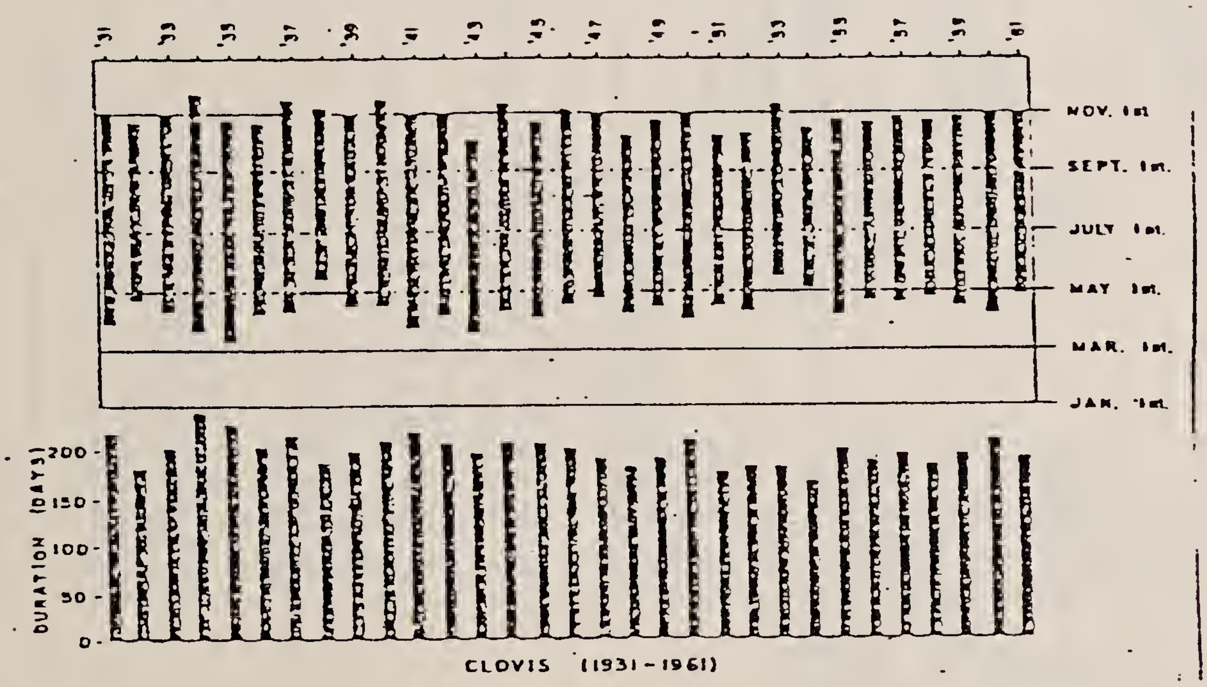
1. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS: SOUTHEAST

2. Temperature

THE PLAINS: DURATION OF SEASON WITHOUT KILLING FROST



County	Station	Temperature					Killing frost average dates				Average precipitation													
		Length of record	January average	July average	Maximum	Minimum	Length of record	Last in spring	First in fall	Growing season	Length of record	January	February	March	April	May	June	July	August	September	October	November	December	Annual
ry	Bellview						12	Apr. 24	Oct. 18	177	18	.31	.30	.58	.86	2.70	2.38	2.74	2.81	1.95	1.61	.58	.41	17.23
	Clovis	27	36.9	78.7	109	-11	26	Apr. 15	Oct. 29	197	28	.33	.44	.70	1.37	2.25	2.76	2.56	2.90	2.46	1.64	.50	.52	18.43
	Field (near)										14	.25	.39	.69	.96	2.09	2.11	2.48	3.09	1.81	2.10	.58	.46	17.01
	Melrose										29	.34	.39	.77	1.25	1.81	2.12	2.26	2.55	2.13	1.33	.64	.57	16.19
	St. Vrain (near)										27	.39	.43	.79	1.34	2.10	2.28	2.40	2.42	1.99	1.49	.64	.60	16.77
oseve	Elida										26	.27	.30	.62	1.10	1.69	2.09	2.19	2.44	2.20	1.17	.50	.46	15.62
	Portales	31	37.0	77.0	109	-28	28	Apr. 15	Oct. 22	190	32	.25	.39	.84	1.32	2.27	2.33	2.52	2.80	2.26	1.29	.66	.63	17.58
	Richland (near)	24	35.7	76.4	109	-29	24	Apr. 18	Oct. 27	192	25	.28	.29	.62	.86	1.61	2.04	2.29	2.14	2.16	1.24	.55	.48	14.57
	Texico (near)										18	.28	.45	.76	1.36	1.76	2.93	2.23	2.52	2.51	1.81	.50	.80	18.54
	Valley View										16	.30	.31	.65	.75	1.65	1.52	2.20	2.16	1.79	1.60	.41	.46	13.70
a	Hobbs	19	41.0	79.3	109	-7	20	Apr. 10	Nov. 3	207	21	.26	.31	.61	1.03	1.13	2.60	1.65	3.01	2.30	1.79	.43	.56	15.6
	Lovington	27	42.1	78.1	107	-10	28	Apr. 5	Oct. 31	209	31	.29	.48	.56	.72	1.34	1.65	2.06	2.31	2.37	1.59	.51	.46	14.3
	Pearl (near)	14	39.5	78.4	107	-30	21	Apr. 12	Nov. 2	204	23	.43	.45	.61	.94	1.28	1.37	1.54	2.11	2.25	1.45	.43	.47	13.3
	Plainview						23	do	Oct. 29	200	27	.40	.55	.63	.99	1.55	1.82	1.83	2.27	2.42	1.45	.51	.65	15.
	Tatum	16	38.7	77.1	108	-32	12	Apr. 17	Oct. 26	194	20	.36	.51	.67	.75	1.79	1.88	2.35	2.73	2.42	1.19	.49	.54	15

3.

Sheet # 30-17.

LATITUDE: 32° 42' N
LONGITUDE: 103° 08' W
ELEV. (GROUND): 3615 Ft.

CLIMATOLOGICAL SUMMARY

STATION: HOBBS
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1921 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)									Mean number of days					
	Means			Extremes								Snow, Sleet							Temperatures				
																			Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	—	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	56.4	27.0	41.7	83	1953	- 3	1948+	720	0.46	1.01	1944	1.4	7.7	1948	4.5	1944	1	0	1	23	*	Jan.
Feb.	61.0	30.8	45.8	87	1940+	- 1	1951	530	0.38	0.87	1821	0.5	3.0	1824+	3.0	1824	1	0	1	17	*	Feb.
Mar.	67.5	35.8	51.6	83	1946	1	1822	420	0.40	0.85	1841	1.0	10.0	1858	6.5	1841	1	*	*	11	0	Mar.
Apr.	76.5	45.1	60.8	98	1828ȸ	17	1939	170	0.89	1.87	1926	0.3	8.0	1942	8.0	1942	2	2	0	2	0	Apr.
May	84.3	54.1	69.2	107	1951	34	1938	10	1.87	4.10	1947	0	0	—	0	--	3	9	0.	0	0	May
June	92.7	63.2	77.8	110	1960+	37	1939	0	1.67	4.04	1821	0	0	--	0	--	3	22	0	0	0	June
July	93.0	65.6	79.4	110	1958	47	1939	0	2.09	3.53	1960	0	0	—	0	--	3	24	0.	0	0	July
Aug.	92.8	65.7	79.1	107	1952	45	1939	0	1.73	2.80	1932ȸ	0	0	—	0	—	3	24	0	0	0	Aug.
Sept.	86.9	58.8	72.9	109	1939	34	1948	0	2.26	4.62	1950	0	0	—	0	—	3	12	0	0	0	Sept.
Oct.	76.6	48.2	62.5	98	1947	23	1925	140	1.93	2.62	1960	T	T	1958	T	1958	3	2	0	*	0	Oct.
Nov.	65.4	35.1	50.3	88	1952	9	1957+	440	0.37	0.78	1940	0.2	4.0	1944	2.0	1944	1	0	*	11	0	Nov.
Dec.	57.9	29.0	43.3	84	1922	1	1926+	670	0.53	1.86	1942	1.4	8.0	1960	5.0	1960+	1	0	1	21	0	Dec.
Year	75.9	46.5	61.2	110	June 1960+	- 3	Jan. 1948+	3100	14.68	4.62	Sept. 1950	4.8	10.0	Mar. 1958	8.0	Apr. 1942	25	85	3	85	*	Year

LATITUDE: 34° 10' N
LONGITUDE: 103° 21' W
ELEV. (GROUND): 4010 Ft.

CLIMATOLOGICAL SUMMARY

STATION: PORTALES
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1931 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)									Mean number of days					
	Means			Extremes								Snow, Sleet							Temperatures				
																			Max.		Min.		
Mo	D max	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
an.	52.6	21.4	37.3	80	1950	-18	1947	860	0.46	1.08	1939	2.5	11.0	1936	5.0	1947+	1	0	2	28	1	Jan.
eb.	58.0	25.3	41.8	83	1950	-28	1933	650	0.36	0.78	1948	1.1	4.2	1938	4.0	1960	1	0	1	22	*	Feb.
Iar.	65.4	30.7	48.2	92	1946	5	1947+	520	0.54	1.15	1933	0.9	6.0	1934+	6.0	1934	1	*	*	18	0	Mar.
pr.	74.6	39.9	57.2	98	1937	11	1945	250	0.77	1.50	1940+	0.4	3.0	1940	3.0	1940	2	1	0	5	0	Apr.
Iay	81.9	50.3	66.1	102	1938	29	1954+	60	2.42	3.30	1957	0	0	—	0	--	4	5	0	*	0	May
une	91.0	59.0	75.2	106	1957	37	1955	0	2.41	4.00	1941	0	0	--	0	--	4	18	0	0	0	June
uly	92.6	62.7	77.6	107	1940	51	1952+	0	2.93	4.36	1948	0	0	--	0	--	4	23	0	0	0	July
ug.	91.5	61.5	76.5	105	1944	47	1944	0	2.66	5.15	1952	0	0	--	0	--	4	21	0	0	0	Aug.
ept.	84.8	54.3	69.5	104	1945	31	1945	30	1.81	2.10	1941	0	0	--	0	--	3	9	0	*	0	Sept.
Dct.	74.9	42.6	58.9	93	1959+	22	1949	220	1.50	2.47	1960	0.2	4.0	1936	4.0	1936	3	*	0	3	0	Oct.
Nov.	62.7	28.8	45.7	90	1950	4	1952+	580	0.45	0.92	1934	0.7	6.0	1931	5.0	1931	1	0	*	20	0	Nov.
Dec.	54.9	23.4	39.1	78	1958	- 9	1939	800	0.58	1.45	1943	2.5	11.5	1931	6.0	1960	2	0	1	28	*	Dec.
Year	73.7	41.7	57.7	107	July 1940	-28	Feb. 1933	3970	16.89	5.15	Aug. 1952	8.3	11.5	Dec. 1931	6.0	Dec. 1960+	30	77	4	124	1	Year

* Less than one half.
** Base 65° F (estimated).
(a) Average length of record, years.

T Trace, an amount too small to measure.
+ Also on earlier dates, months, or years.
ȸ Partial year's record considered.

CLIMATE OF PORTALES, NEW MEXICO

C. 3. Continued

The frost-free season ranges from 190 to 210 days between early April and early November. Nearly 85 percent of the average annual 13.5 to 18.5 inches of precipitation falls during this frost-free period. Most rainfall occurs as brief and frequently heavy thundershowers occasionally accompanied by hail and favors the growth of native, perennial, warm-season vegetation. A minor amount of precipitation falls as snow in the winter and usually melts within a few hours. Practically all moisture received in this area originates in the Gulf of Mexico. Occasionally an upslope movement of moist air from the Gulf results in steady, prolonged rains but these are rare and usually occur in the spring or fall, benefitting the minority population of cool-season plants.

4. Strong winds from the south and southwest prevail from February through May. This accelerates drying of the surface soil during a time when it is normally low in moisture and also when relative humidity is the lowest. The wind blows from the south more often than from any other direction. The average hourly wind velocity is about 12 miles per hour throughout the year. In the northern end of HP-3 occasional upslope movements of air in the winter may produce low cloudiness, rain and icing for several hours at a time.

D. SOILS

1. These are well drained, deep soils with a few moderately deep soils included. The surface textures are typically loam with some clay loams included. The textures of the subsurface layers are loam, clay loam and sandy clay loam. Permeability is moderate in most of the soils with some moderately slow in the clay loam phases. The available water capacity is high. The effective rooting depth is 26 to 40 inches. The plant-soil-air-water relationship is good. These subsoils once wetted can store available water for relatively long periods of time to the advantage of vigorous plants with long, healthy root systems. Greatest production from these soils is obtained by a plant community which has root systems that can work the entire wetted soil profile.

2. Soil Taxonomic Units Included in This Site

Representative Soils are:

Acuff loam
Mansker loam
Portales loam
Zita loam
Estacado loam

Other Soils Included in this Site:

Lea loam
Stegall loam
Pullman clay loam
Olton loam and clay loam
Berda loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The aspect of the potential natural plant community on this site is that of a mixed mid and short grass prairie. Shrubs and half-shrubs are generally scarce, inconspicuous and widely scattered. Dominant in composition are grasses such as the gramas, little bluestem and buffalograss. A variety of perennial forbs is also present. Response to dynamic climatic flux is exhibited by the annual grass and forb components. The perennial grass and forb components remain fairly constant in relation to each other, with the total production of both increasing or decreasing in a parallel manner during wet or dry years and cycles. The woody component is relatively constant excluding man-made disturbances or fire. Taller, deeper rooted vegetation is limited more by wetted soil depth as influenced by climate than it is by total soil depth, since the precipitation on this site is not commensurate with the total soil depth or the ability of the site to hold moisture. Vegetative production is quite variable within this site, the lower, concave or depressed, runoff-receiving positions in the landscape producing one and a half to twice as much herbage weight as the higher, convex, runoff-yielding positions on the landscape.

5. Continued

2. Composition of Potential Plant Community

Expressed as approximate percentage of total, annual, air-dry vegetative production

Grasses and Grasslike Plants	80-85%
Sideoats grama	20
Blue grama	30
Hairy grama	
Buffalograss	5
Black grama	5
Indiangrass	3-5
Little bluestem	
[illegible]	
Silver bluestem	3-5
Arizona cottontop	
Plains bristlegrass	
Vine-mesquite	3-5
[illegible]g muhly	
Tobosa	
Alkali sacaton	
Wolftail	5
Halls panicum	
Sand dropseed	
Threeawns	5
Slim tridens	
Ring muhly	
Six weeks grama	1-3
Other annual grasses	

Woody-Shrubs, Half-Shrubs, Vines and Trees	2-5%
Small soapweed	1-3
Winterfat	
Engelmann pricklypear	
Plains pricklypear	
Pale wolfberry	1-2
Broom snakeweed	
Devilshead hedgehog cactus	
Walkingstick cholla	
Wright eriogonum	

Forbs	10-15%
Globemallow	5
Verbena	
Senna	
Rocky Mountain zinnia	
Lemon scurfpea	
Dotted Gayfeather	
Upright prairie coneflower	2-3
American vetch	
Lyreleaf greeneye	
Wavyleaf thistle	
Hopitea greenthread	
Indian rushpea	
Indian blanket	
Bladderpod	
Fleabane	
Curlycup gumweed	2-3
Broadleaf milkweed	
Prickly poppy	
Coyote melon	
Buffalobur	
Silverleaf nightshade	
Locoweed	
Cutleaf Haplopappus	
Tansymustard	
Peavine	
Pingue	
Wooly groundsel	
Threadleaf groundsel	
Annual sunflower	1-5
Stickleaf	
Texas filaree	
Other annual forbs	

E. Continued

3. Ground Cover (Percent of Surface Area)

Grasses and Forbs - Plant Density		40%
Shrubs and Half-shrubs - Canopy		2%
Bare ground		15%
Surface gravel		< 2%
Surface cobble and stones		< 1%
Litter	Percent of area	40%
	Average depth in cm	< 3%

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air Dry)

Favorable Years	1750 lbs/acre
Median Years	1400 lbs/acre
Unfavorable Years	800 lbs/acre

G. SITE INTERPRETATIONS

1. Grazing

This site provides forage suitable for grazing during all seasons of the year, although by itself it lacks cover and protection for livestock from winter storms. It is suitable for grazing by all classes of cattle and also by sheep where protection from, and control of predators can be provided. This site, when in high condition, is not well suited for goats due to the lack of woody browse which is highly preferred and constitutes a large portion of the goat diet. In general, cattle grazing will result in a decrease in palatable mid-grasses and forbs with a corresponding increase in low value grasses, unpalatable and poisonous forbs, and noxious brush. Sheep grazing results in a marked decrease in palatable forbs, and short grasses with an increase in low value grasses and shrubs. Continuous yearlong grazing or grazing continually during the potential growing season results in a loss of sideoats grama, little bluestem, indiangrass, Arizona cottontop, winterfat, black grama and plains bristlegrass, allowing blue grama and buffalograss to take over the site. Grazing when the soil surface is wet also results in severe soil compaction, greatly reducing water intake, permeability and total water penetration depth to the further detriment of the deeper rooted, more productive species. Eventually, cholla cactus proliferates and mesquite invades, severely impairing the grazing value of the site. Well planned systems of deferred grazing by domestic livestock which vary the seasons of grazing, and rest in pastures during successive years, will result in a balanced plant community providing high quality forage and browse during all seasons of the year.

2. Wood Products

The natural potential plant community of this site affords little or no wood products of value.

3. Habitat for Wildlife

(To be completed by biologist)

G. Continued

4. Hydrological Interpretations

The hydrologic groups for soils in this series are as follows:

Soil Series	Hydrologic Group
Acuff	B
Estacado	B
Mansker	B
Portales	B
Zita	B
Berda	B
Lea	C
Olton	C
Pullman	D
Stegall	C

The hydrologic curve number when vegetation is in its potential condition is 63 for the B soils; 75 for the C soils; and 86 for the D soil.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, quail and dove hunting, antelope hunting and predator hunting. Small playa lakes are abundant throughout the landscape. During years of abundant winter and spring moisture this site displays a variety of wildflowers in a wide spectrum of colors from May through August. A few fall blooming flowers are also present, maturing from summer rainfall moisture.

6. Endangered Plants and Animals

There are presently no known endangered plant species which are a part of the potential plant community of this site. As these become known, they will be added to this section.

(Animal portion to be completed by biologist)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rates

Condition Class	%Potential Vegetation	Acres per Animal Unit Month
Excellent	100-76	2.0 - 3.1
Good	75-51	3.0 - 4.3
Fair	50-26	4.2 - 7.0
Poor	25-0	7.5 +

H. 2. Relative Quality of Plants for Animal Use[1]

(a) Cattle

Primary

Sideoats grama
Blue grama
Black grama
Indiangrass
Little bluestem
Arizona cottontop
Plains bristlegrass
Vine-mesquite
Alkali sacaton
Wolftail
Globemallow
Verbena
Dotted gayfeather
American vetch
Hopitea greenthread
Indian rushpea
Annual sunflower
Texas filaree
Winterfat

Secondary

Hairy grama
Buffalograss
Silver bluestem
Creeping muhly
Tobosa
Halls panicum
Sand dropseed
Slim tridens
Sixweeks grama
Other annual grasses
Senna
Rocky Mountain Zinnia
Lemon scurfpea
Upright prairie coneflower
Lyreleaf greeneye
Indian blanket
Fleabane
Bladderpod
Stickleaf
Other annual forbs
Small soapweed
Wright eriogonum

Low Value

Threeawns
Ring muhly
Wavyleaf thistle
Curlycup gumweed
Broadleaf milkweed
Pricklypoppy
Coyotemelon
Buffalobur
Silverleaf nightshade
Locoweed
Cutleaf Haplopappus
Tansymustard
Redstemmed peavine
Pingue
Wooly groundsel
Threadleaf groundsel
Pale wolfberry
Engelmann pricklypear
Plains pricklypear
Broom snakeweed
Devilshead hedgehog cactus
Walkingstick cholla

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[1] See Attachment #1, "Legends and Definitions for Range Site Descriptions"

H. 2. Continued

(b) Sheep

Primary

- Globemallow
- Verbena
- Senna
- Rocky Mountain Zinnia
- Lemon scurfpea
- Dotted gayfeather
- Upright prairie coneflower
- American vetch
- Lyreleaf greeneye
- Hopitea greenthread
- Indian rushpea
- Indian blanket
- Bladderpod
- Fleabane
- Annual sunflower
- Sixweeks grama
- Stickleaf
- Slim tridens
- Texas filaree
- Halls panicum
- Other annual forbs
- Wolftail
- Sideoats grama
- Vine-mesquite
- Blue grama
- Plains bristlegrass
- Hairy grama
- Wright eriogonum
- Buffalograss
- Winterfat
- Black grama

Secondary

- Cutleaf Haplopappus
- Indiangrass
- Little bluestem
- Silver bluestem
- Arizona cottontop
- Creeping muhly
- Tobosa
- Alkali sacaton
- Sand dropseed
- Other annual grasses
- Pale wolfberry

Low Value

- Wavyleaf thistle
- Curlycup gumweed
- Broadleaf milkweed
- Pricklypoppy
- Coyote melon
- Buffalobur
- Silverleaf nightshade
- Locoweed
- Tansymustard
- Redstemmed peavine
- Pingue
- Wooly groundsel
- Threadleaf groundsel
- Threeawns
- Ring muhly
- Small soapweed
- Engelmann pricklypear
- Plains pricklypear
- Broom snakeweed
- Devilshead hedgehog cactus
- Walkingstick cholla

H. 2. Continued

(c) Antelope

Primary

- Annual sunflower
- Bladderpod
- Buffalobur
- Indian blanket
- Globemallow
- Hopitea greenthread
- Locoweed
- Stickleaf
- Texas filaree
- Verbena
- Coyote melon
- Wright eriogonum
- Wolftail
- Halls panicum
- Lyreleaf greeneye
- Slim tridens
- Cutleaf Haplopappus
- Redstemmed peavine
- Dotted gayfeather
- Senna
- Thistle
- Plains bristlegrass
- Tansy mustard
- Broom snakeweed
- Fleabane
- Winterfat
- Curlycup gumweed
- Indian rushpea
- Pingue

Secondary

- Blue grama
- Sideoats grama
- Arizona cottontop
- Black grama
- Buffalograss
- Creeping muhly
- Indiangrass
- Lemon scurfpea
- Little bluestem
- Ring muhly
- Silver bluestem
- Vine-mesquite
- Upright prairie coneflower
- Other annual grasses
- Other annual forbs

Low Value

- Hairy grama
- Threeawns
- Small soapweed
- Other perennial grasses
- Other shrubs

H. 2. Continued

(d) Quail and Dove

Primary	Secondary	Low Value
Globemallow	Sand dropseed	Black grama
Lemon scurfpea	Dotted gayfeather	Sideoats grama
Annual sunflower	Halls panicum	Threeawns
Broom snakeweed	Stickleaf	Hairy grama
Senna	Slim tridens	Small soapweed
Wright eriogonum	Buffalograss	Fleabane
Plains bristlegrass	Engelmann pricklypear	Blue grama
Indian rushpea	Plains pricklypear	Creeping muhly
American vetch	Indian blanket	Texas filaree
Rocky Mountain zinnia	Verbena	Other perennial grasses
	Cutleaf Haplopappus	Other shrubs
	Arizona cottontop	Other annual forbs
	Vine-mesquite	Silverleaf nightshade
	Pale wolfberry	
	Other perennial forbs	
	Other annual grasses	

I. IDENTIFICATION AND AUTHORIZATION

1. USDA Soil Conservation Service
   New Mexico State Office, Albuquerque, New Mexico
   High Plains, MLRA-77

2. Field Offices where Site occurs

   Lovington
   Portales
   Clovis
   Tucumcari

3. Best Example Location in Sub-Resource Area

   Lea County, New Mexico - extreme southern edge of central portion of SW¼ Section 3, T-16S, R-37E, NMPM. 6¼ miles east of Lovington on Highway 83, in north side of highway right-of-way. Lea Soil Survey Sheet #39. Zita loam mapping unit. Symbol Zt.

4. Site Approval:

State Range Conservationist — Date

Regional Range Conservationist — Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing.

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plants listed.

Draft
8/18/77
N.M.

RANGE SITE DESCRIPTION

Section IIe, Technical Guide

A. Site No. HP-77-52 - Tx N Loamy Sand HP-3

B. PHYSIOGRAPHIC FEATURES

1. This site occurs on nearly level to gently undulating plains; namely the high plains of southeastern New Mexico and adjacent west Texas.

2. Slopes range from 0 to 5 percent but are usually less than 2 percent. Direction of slope varies and is usually not significant.

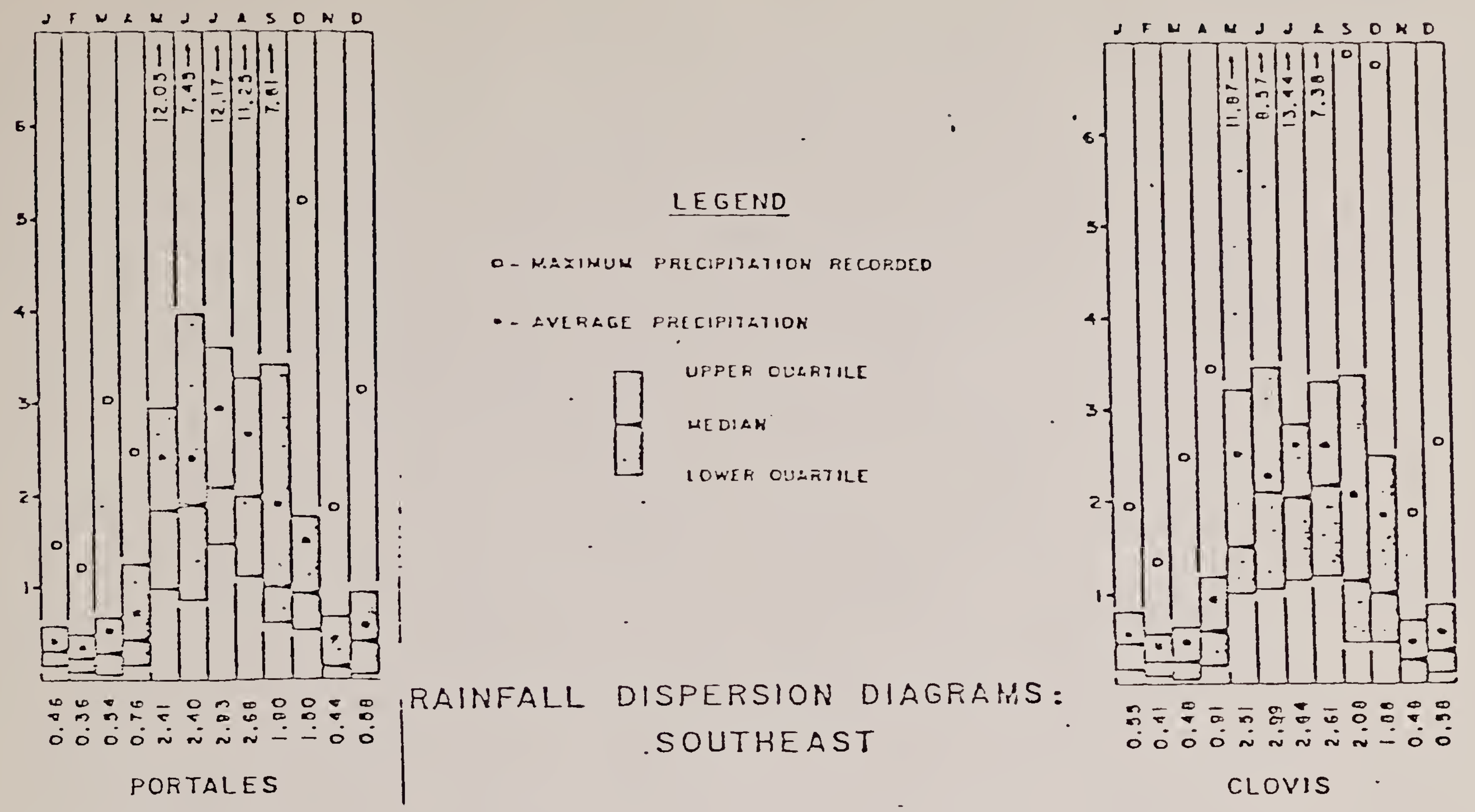
3. Elevations range from 3550 to 4300 feet.

C. CLIMATIC FEATURES

The climate of this area is classified as semi-arid continental, characterized by warm summers, cool dry winters, and abundant sunshine. About 75 percent of the possible sunshine is received throughout the year.

C. CLIMATIC FEATURES

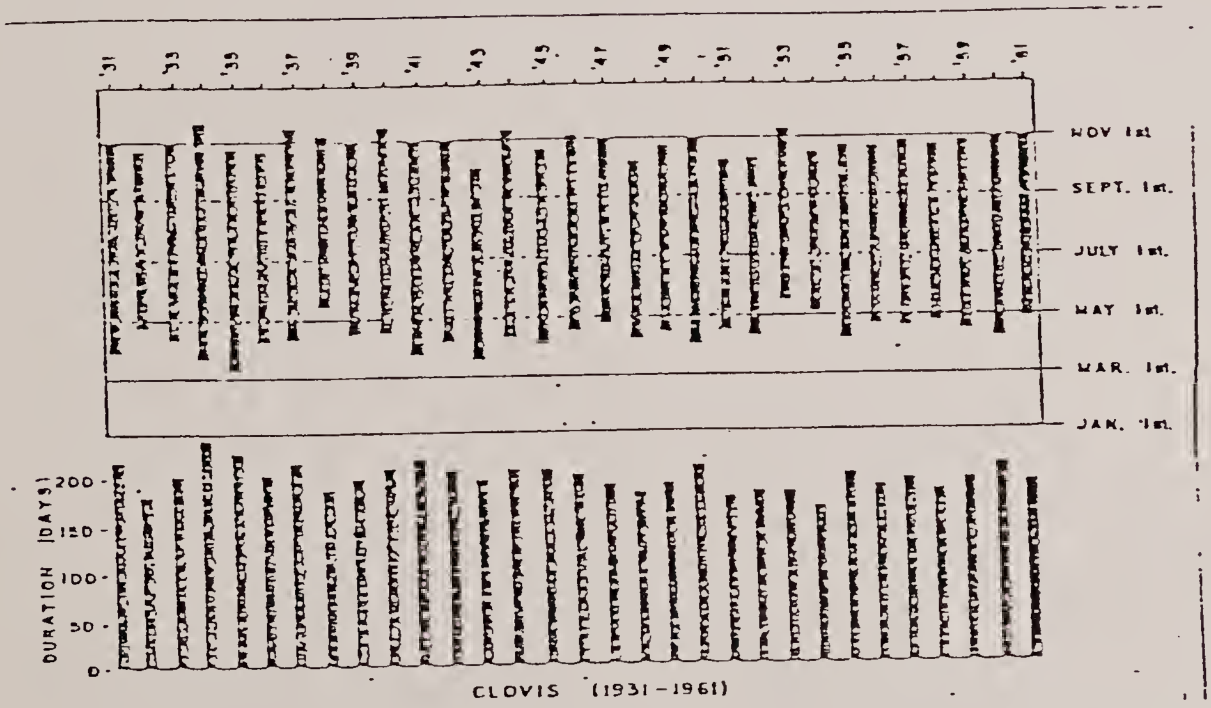
1. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS: SOUTHEAST

2. Temperature

THE PLAINS: DURATION OF SEASON WITHOUT KILLING FROST



County	Station	Temperature					Killing frost average dates				Average precipitation													
		Length of record	January average	July average	Maximum	Minimum	Length of record	Last in spring	First in fall	Growing season	Length of record	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	Bellview						12	Apr. 24	Oct. 18	177	15	.31	.30	.58	.86	2.70	2.35	2.74	2.81	1.95	1.61	.58	.41	17.23
	Clovis	27	36.9	75.7	109	−11	26	Apr. 15	Oct. 29	197	28	.33	.44	.70	1.37	2.25	2.76	2.56	2.90	2.40	1.64	.50	.52	18.43
	Field (near)										14	.25	.39	.69	.96	2.09	2.11	2.48	3.09	1.81	2.10	.58	.46	17.01
	Melrose										29	.34	.39	.77	1.25	1.81	2.12	2.26	2.55	2.13	1.35	.64	.57	16.19
	St. Vrain (near)										27	.39	.43	.79	1.34	2.10	2.28	2.40	2.42	1.99	1.49	.64	.60	16.77
	Elida										26	.27	.30	.62	1.10	1.69	2.06	2.19	2.44	2.20	1.17	.50	.46	15.62
	Portales	31	37.0	77.0	109	−28	28	Apr. 15	Oct. 22	190	32	.25	.39	.84	1.32	2.27	2.33	2.52	2.80	2.28	1.29	.66	.63	17.58
	Richland (near)	23	35.7	76.4	109	−29	24	Apr. 18	Oct. 27	192	26	.28	.29	.62	.96	1.61	2.04	2.25	2.14	2.16	1.24	.55	.48	14.57
	Texico (near)										18	.28	.45	.76	1.16	1.76	2.93	2.23	2.52	2.51	1.81	.50	.81	18.54
	Valley View										16	.30	.31	.65	.75	1.65	1.52	2.20	2.16	1.79	1.60	.41	.46	13.70
	Hobbs	19	41.0	79.3	109	−7	20	Apr. 10	Nov. 3	207	21	.26	.31	.61	1.03	1.13	2.60	1.65	3.01	2.30	1.79	.43	.56	15.65
	Lovington	27	42.1	78.1	107	−10	28	Apr. 5	Oct. 31	209	31	.29	.48	.56	.72	1.34	1.65	2.06	2.31	2.37	1.59	.51	.46	14.34
	Pearl (near)	14	39.5	78.4	107	−30	21	Apr. 12	Nov. 2	204	23	.43	.45	.61	.94	1.28	1.37	1.54	2.11	2.25	1.45	.43	.47	13.33
	Plainview						23	do	Oct. 29	200	27	.40	.55	.63	.99	1.55	1.82	1.83	2.27	2.42	1.45	.51	.62	15.07
	Tatum	16	35.7	77.1	108	−32	12	Apr. 17	Oct. 26	194	20	.36	.51	.67	.75	1.79	1.88	2.35	2.73	2.42	1.19	.49	.54	15.65

LATITUDE: 32° 42' N
LONGITUDE: 103° 08' W
ELEV. (GROUND): 3615 Ft.

CLIMATOLOGICAL SUMMARY

STATION: HOBBS
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1921 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes								Snow, Sleet						Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	56.4	27.0	41.7	83	1953	- 3	1948+	720	0.46	1.01	1944	1.4	7.7	1948	4.5	1944	1	0	1	23	*	Jan.
Feb.	61.0	30.8	45.9	87	1940+	- 1	1951	530	0.38	0.87	1921	0.5	3.0	1924+	3.0	1924	1	0	1	17	*	Feb.
Mar.	67.5	35.8	51.6	93	1946	1	1922	420	0.40	0.95	1941	1.0	10.0	1958	6.5	1941	1	*	*	11	0	Mar.
Apr.	76.5	45.1	60.8	98	1928¢	17	1939	170	0.89	1.87	1926	0.3	8.0	1942	8.0	1942	2	2	0	2	0	Apr.
May	84.3	54.1	69.2	107	1951	34	1938	10	1.97	4.10	1947	0	0	--	0	--	3	9	0.	0	0	May
June	92.7	63.2	77.9	110	1960+	37	1939	0	1.67	4.04	1921	0	0	--	0	--	3	22	0	0	0	June
July	93.0	65.6	79.4	110	1958	47	1939	0	2.09	3.53	1960	0	0	—	0	--	3	24	0	0	0	July
Aug.	92.8	65.7	79.1	107	1952	45	1939	0	1.73	2.80	1932¢	0	0	—	0	—	3	24	0	0	0	Aug.
Sept.	86.8	58.8	72.9	109	1939	34	1948	0	2.26	4.62	1950	0	0	--	0	--	3	12	0	0	0	Sept.
Oct.	76.6	48.2	62.5	98	1947	23	1925	140	1.83	2.62	1960	T	T	1958	T	1958	3	2	0	*	0	Oct.
Nov.	65.4	35.1	50.3	88	1952	8	1957+	440	0.37	0.78	1940	0.2	4.0	1944	2.0	1944	1	0	*	11	0	Nov.
Dec.	57.9	29.0	43.3	84	1922	1	1926+	670	0.53	1.86	1942	1.4	8.0	1960	5.0	1960+	1	0	1	21	0	Dec.
Year	75.8	46.5	61.2	110	June 1960+	- 3	Jan. 1948+	3100	14.68	4.62	Sept. 1950	4.8	10.0	Mar. 1958	8.0	Apr. 1942	25	85	3	65	*	Year

LATITUDE: 34° 10' N
LONGITUDE: 103° 21' W
ELEV. (GROUND): 4010 Ft.

CLIMATOLOGICAL SUMMARY

STATION: PORTALES
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1931 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes								Snow, Sleet						Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	52.6	21.4	37.3	80	1950	-18	1947	860	0.46	1.08	1939	2.5	11.0	1936	5.0	1947+	1	0	2	28	1	Jan.
Feb.	58.0	25.3	41.8	83	1950	-28	1933	650	0.36	0.78	1948	1.1	4.2	1938	4.0	1960	1	0	1	22	*	Feb.
Mar.	65.4	30.7	48.2	92	1946	5	1947+	520	0.54	1.15	1933	0.9	6.0	1934+	6.0	1934	1	*	*	18	0	Mar.
Apr.	74.6	39.9	57.2	98	1937	11	1945	250	0.77	1.50	1940+	0.4	3.0	1940	3.0	1940	2	1	0	5	0	Apr.
May	81.9	50.3	66.1	102	1938	29	1954+	60	2.42	3.30	1957	0	0	--	0	--	4	5	0	*	0	May
June	91.0	59.0	75.2	106	1957	37	1955	0	2.41	4.00	1941	0	0	--	0	--	4	18	0	0	0	June
July	92.6	62.7	77.6	107	1940	51	1952+	0	2.93	4.36	1948	0	0	--	0	--	4	23	0	0	0	July
Aug.	91.5	61.5	76.5	105	1944	47	1944	0	2.66	5.15	1952	0	0	--	0	--	4	21	0	0	0	Aug.
Sept.	84.8	54.3	69.5	104	1945	31	1945	30	1.91	2.10	1941	0	0	--	0	--	3	8	0	*	0	Sept.
Oct.	74.9	42.6	58.9	93	1959+	22	1949	220	1.50	2.47	1960	0.2	4.0	1936	4.0	1936	3	*	0	3	0	Oct.
Nov.	62.7	28.8	45.7	90	1950	4	1952+	580	0.45	0.92	1934	0.7	6.0	1931	5.0	1931	1	0	*	20	0	Nov.
Dec.	54.9	23.4	39.1	78	1958	- 9	1939	800	0.58	1.45	1943	2.5	11.5	1931	6.0	1960	2	0	1	28	*	Dec.
Year	73.7	41.7	57.7	107	July 1940	-28	Feb. 1933	3970	16.99	5.15	Aug. 1952	8.3	11.5	Dec. 1931	6.0	Dec. 1960+	30	77	4	124	1	Year

* Less than one half.

** Base 65° F (estimated).

(a) Average length of record, years.

T Trace, an amount too small to measure.

+ Also on earlier dates, months, or years.

¢ Partial year's record considered.

CLIMATE OF PORTALES, NEW MEXICO

C. 3. continued

The frost-free season ranges from 190 to 210 days between early April and early November. Nearly 85 percent of the average annual 13.5 to 18.5 inches of precipitation falls during this frost-free period. Most rainfall occurs as brief and frequently heavy thundershowers occasionally accompanied by hail and favors the growth of native, perennial, warm-season vegetation. A minor amount of precipitation falls as snow in the winter and usually melts within a few hours. Practically all moisture received in this area originates in the Gulf of Mexico. Occasionally an upslope movement of moist air from the Gulf results in steady, prolonged rains but these are rare and usually occur in the spring or fall benefitting the minority population of cool-season plants.

4. Strong winds from the south and southwest prevail from February through May. This accelerates drying of the surface soil during a time when it is normally low in moisture and also when relative humidity is the lowest. The wind blows from the south more often than from any other direction. The average hourly wind velocity is about 12 miles per hour throughout the year.

D. SOILS

1. These are deep, well drained soils. The surface textures are fine sand and loamy fine sand. The texture of the subsurface layers is sandy clay loam which occurs at depths between 20 and 40 inches. Permeability is moderate. The available water capacity is low. The effective rooting depth is about 50 inches. The plant-soil-air-water relationship is good. Moisture that falls on this site is readily absorbed. Winter and early spring moisture can be stored in the subsoils for earlier greenup by the deeper rooted plants. The surface soils, if unprotected by plant cover and organic residues, become wind blown and low hummocks are formed.

2. Soil Taxonomic Units Included in this Site

Representative Soils are:

Brownfield fine sand
Jalmar fine sand
Triomas fine sand
Triomas loamy fine sand

Other soils included in this site are:

(Field Offices to list these)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The aspect of the potential plant community of this site is that of a grassland dominated by tall and mid grasses such as sand bluestem, yellow indiangrass and little bluestem. Only scattered plants of the larger shrubs such as sand sagebrush, southwest rabbitbrush and small soapweed are evident upon an initial distant view from a horizontal perspective. Closer examination will reveal a suppressed, minority understory of shinnery oak and a stratified plant community of tall and mid grasses, shrubs, short grasses and annual and perennial forbs which completely occupies and utilizes all moist layers of the soil profile. The annual grass and forb population fluctuates considerably from year to year with variation in total amount and seasonable distribution of rainfall. The perennial grass, forb and shrub components are somewhat less dynamic and vary with longer term moisture cycles.

E. Continued

2. Composition of Potential Plant Community

Expressed as approximate percentage of total, annual, air-dry vegetative production.

Grasses and Grass-like Plants	50-70	Woody-Shrubs, Half-Shrubs Vines and Trees	10-25	Forbs	20-35
Sand bluestem	25-30	Sand plum	1-3	Dotted gay feather	10-15
Giant sandreed	1-5	Southwest rabbitbrush	1-2	Germander	
Indiangrass	1-3	Small soapweed	1-5	Prairie dogbane	
Giant dropseed		Shinnery oak	5-10	Upright prairie cone-flower	
Little bluestem	3-5	Sand sagebrush	1-3	Lemon beebalm	
Sideoats grama	1-3	Broom snakeweed	1-2	Globemallow	
New Mexico feathergrass	1-3			Gilia Penstemon	
Needle and thread				Spectaclepod	
Sand paspalum	1-3			Silky prairie clover	
Fall witchgrass				Snow-on-the-mountain	
Black grama	1-5			Lemon scurfpea	
Hairy grama				Birdbill dayflower	
H[illegible] panicum				Lanceleaf sage	
Threeawns	5-10			Smooth four-o'clock	
Red lovegrass				Plains blackfoot	2-5
Gummy lovegrass				Stickleaf	
Tumble lovegrass				Croton	
Sand dropseed				Peppergrass mustard	
Spike dropseed				Paperflower	
Flatsedge	1-3			Linum	
Field sandbur				Hopitea greenthread	
False buffalograss				Houstonia	
Tumblegrass				Groundcherry	
Other annual grasses				Fleabane	3-5
				Southern jointweed	
				Sand verbena	
				Western ragweed	
				Queens delight	
				Milky spurge	
				Phlox heliotiophe	
				Halfshrub sundrop	
				Wooly dalea	
				Bush morningglory	
				Wooly gaura	
				Cocklebur	
				Bipinnate thistle	
				Annual wild buckwheat	5-10
				Annual sunflower	
				Other annual forbs	

E. Continued

3. Ground Cover (Percent of Surface Area)

Grasses and Forbs - Plant Density		35%
Shrubs and Half-shrubs - Canopy		10%
Bare ground		15%
Surface gravel		0%
Surface cobble and stones		0%
Litter	Percent of area	40%
	Average depth in cm.	> 3

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air Dry)

Favorable Years	3200 lbs/Acre
Median Years	2800 lbs/Acre
Unfavorable Years	1800 lbs/Acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It is most suitable for grazing by mature cattle due to the high composition of tall grasses and other coarse forage and browse. Sheep do not do well on this site. If protection from or control of predators can be provided, it would also be suitable for minor proportions of goats. Grazing by goats would also be of value from a brush control standpoint where woody plants have increased considerably or invaded. In general, cattle grazing will result in a decrease of grasses and an increase in unpalatable forbs and woody plants. Continuous year-long grazing or grazing continually during the potential growing season will result in a decrease in the vigor and abundance of sand bluestem, little bluestem, indiangrass, giant sandreed, sideoats grama, sand-paspalum and black grama. A corresponding increase will occur in threeawns, dropseeds, field sandbur, shinnery oak, sand sagebrush and yucca. Eventually mesquite will invade and the site will be dominated by brushy species and greater areas of bare exposed soil. Well planned systems of deferred grazing by domestic livestock which vary the seasons of grazing and rest in pastures during successive years will result in a balanced plant community providing high quality forage and browse during all seasons of the year.

2. Wood Products

The natural potential plant community of this site affords little or no wood products of value. Where the site has deteriorated to brushy species, yucca stalks and the roots and lower stems of mesquite and shinnery oak provide attractive materials for dried flower arrangements, "driftwood", small furniture and other curiosities.

3. Habitat for Wildlife

(To be completed by biologist)

G. Continued

4. Hydrological Interpretations

The hydrologic groups for soils in this site are as follows:

Soil Series	Hydrologic Group
Brownfield	A
Jalmar	A
Triomas	B

The hydrologic curve number when vegetation is in its potential condition is 39 for A soils and 64 for B soils.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, quail and dove hunting, antelope hunting, and predator hunting.

During years of abundant spring moisture this site displays wildflowers in a wide spectrum of colors from May through August. A few fall blooming flowers also occur. If moisture is confined to the summer rainy period only the view of a virtual "sea of grass" portrayed by waves of head-high sand bluestem will be rewarding to those who appreciate a tall grass prairie.

6. Endangered Plants and Animals

There are presently no known endangered plants which are a part of the natural potential plant community of this site. As these become known they will be added to this section.

(Endangered Animal portion to be completed by biologist)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rates

Condition Class	%Potential Vegetation	Acres per Animal Unit Month
Excellent	100-76	2.1 - 3.0
Good	75-51	2.9 - 4.4
Fair	50-26	4.5 - 8.0
Poor	25-0	10.5 - +

2. Relative Quality of Plants for Animal Use[1]

(a) Cattle

Primary

Sand bluestem
Giant sandreed
Indiangrass
Giant dropseed
Little bluestem
Sideoats grama
New Mexico feathergrass
Needleand thread
Sand paspalum
Black grama
Sand plum
Dotted gayfeather
Globemallow
Gilia penstemon
Birdbill dayflower
Plains blackfoot
Annual sunflower
Hopitea greenthread
Phlox heliotrope

Secondary

Fall witchgrass
Hairy grama
Halls panicum
Red lovegrass
Sand dropseed
Spike dropseed
Flatsedge
Other annual grasses
Small soapweed
Shinnery oak
Sand sagebrush
Germander
Prairie dogbane
Upright prairie coneflower
Lemon beebalm
Silky prairie clover
Halfshrub sundrop
Bush morningglory
Other Annual forbs
Other perennial forbs

Low Value

Threeawns
Gummy lovegrass
Tumble lovegrass
Field sandbur
False buffalograss
Tumblegrass
Southwest rabbitbrush
Broom snakeweed
Croton
Paperflower
Southern jointweed
Western ragweed
Queens delight
Cocklebur
Bipinnate thistle
Annual wild buckwheat

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[1] See Attachment #1, "Legends and Definitions for Range Site Descriptions"

H. 2. continued

(b) Goats

Primary

Sand plum
Shinnery oak
Southwest rabbitbrush
Sand sagebrush
Bush morningglory
Gilia penstemon
Croton
Phlox heliotrophe

Secondary

Small soapweed
Broom snakeweed
Other perennial forbs
Other annual forbs
Black grama
Fall witchgrass
Hairy grama
Halls panicum
New Mexico feathergrass
Needleandthread
Sideoats grama

Low Value

Cocklebur
Western ragweed
Tumblegrass
Tumble windmillgrass
Tumble lovegrass
Other perennial grasses
Other annual grasses

(c) Antelope

Dotted gayfeather
Globemallow
Fleabane
Croton
Plains blackfoot
Paperflower
New Mexico feathergrass
Wooly dalea
Broom snakeweed
Peppergrass mustard
Halfshrub sundrop
Linum
Smooth four-o'clock
Snow-on-the-mountain
Stickleaf
Spectaclepod
Annual wild buckwheat

Lemon scurfpea
Black grama
Sideoats grama
Sand dropseed
Other annual grasses
Southwest rabbitbrush
Sand sagebrush
Shinnery oak
Sand plum
Lemon beebalm
Southern jointweed
Wooly gaura
Giant dropseed
Indiangrass
Little bluestem
Red lovegrass
Sand bluestem
Spike dropseed
Other annual forbs

Hairy grama
Threeawns
Flatsedge
Small soapweed
Other shrubs
Other perennial grasses
Other perennial forbs

H. 2. continued

(d) Quail and Dove

Primary	Secondary	Low Value
Globemallow	Sand dropseed	Black grama
Croton	Dotted gayfeather	Sideoats grama
Lemon scurfpea	False buffalograss	Threeawns
Plains blackfoot	Halls panicum	Hairy grama
Annual sunflower	Annual wild buckwheat	New Mexico feathergrass
Western ragweed	Stickleaf	Flatsedge
Snow-on-the-mountain	Wooly gaura	Small soapweed
Broom snakeweed	Spectaclepod	Paperflower
Sand plum	Linum	Fleabane
Groundcherry	Shinnery oak	Wooly dalea
	Southwest rabbitbrush	Other perennial grasses
	Other perennial forbs	Sand sagebrush
	Other annual grasses	Other shrubs
		Other annual forbs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA Soil Conservation Service
   New Mexico State Office, Albuquerque, New Mexico
   High Plains, MLRA-77

2. Field Offices where site occurs

   Lovington
   Portales
   Clovis
   Tucumcari

3. Best Example Location in Sub-Resource Area
   Roosevelt County, New Mexico - SE¼, NE¼ Section 10, T-1S, R. 34E, NMPM. 3 miles north of Portales, New Mexico, Roosevelt County Soil Survey Map Sheet #43. W. R. Bauske Ranch. Be mapping unit, Brownfield fine sand.

4. Site Approval:

State Range Conservationist   Date

Regional Range Conservationist   Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing.

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plants listed.

DRAFT: 1/4/78
Noel Marsh

A. SITE NUMBER HP-77-57-TxN

Sandhills HP-3

B. PHYSIOGRAPHIC FEATURES

1. This site occurs on undulating to hilly upland plains, namely the high plains of southeastern New Mexico and adjacent west Texas. The site is normally in the form of vegetated dunes, dune barchans, dune seifs and dune whalebacks.

2. Slopes are complex with gradients ranging from about 5 to 30 percent. The gentler slopes are normally on the windward side of whalebacks.

3. Elevations range from 3,550 to 4,300 feet.

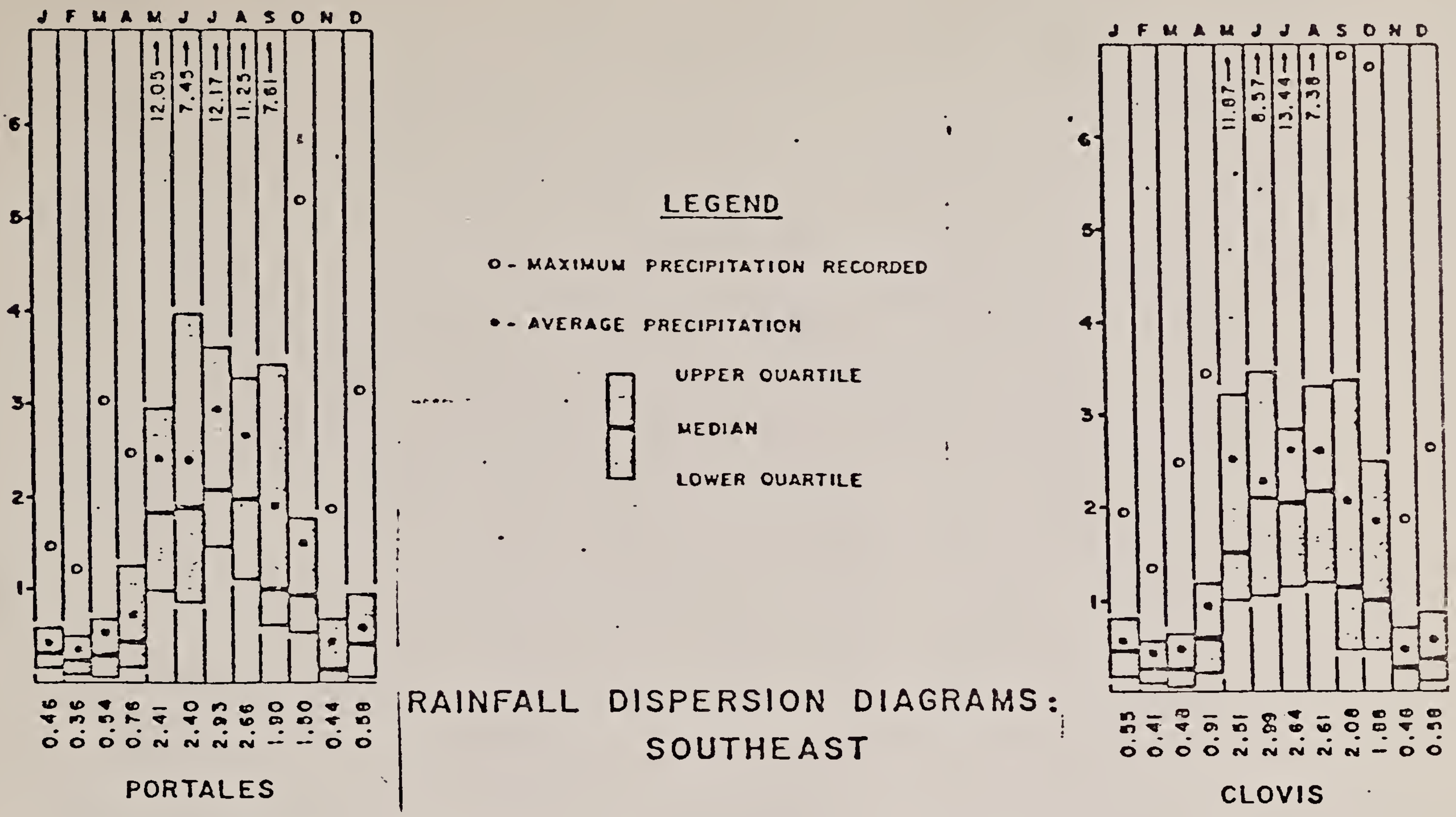
C. CLIMATIC FEATURES

The climate of this area is classified as semiarid continental, characterized by warm summers, cool, dry winters, and abundant sunshine. About 75 percent of the possible sunshine is received throughout the year.

C. CLIMATIC FEATURES

Sheet 2 of 15

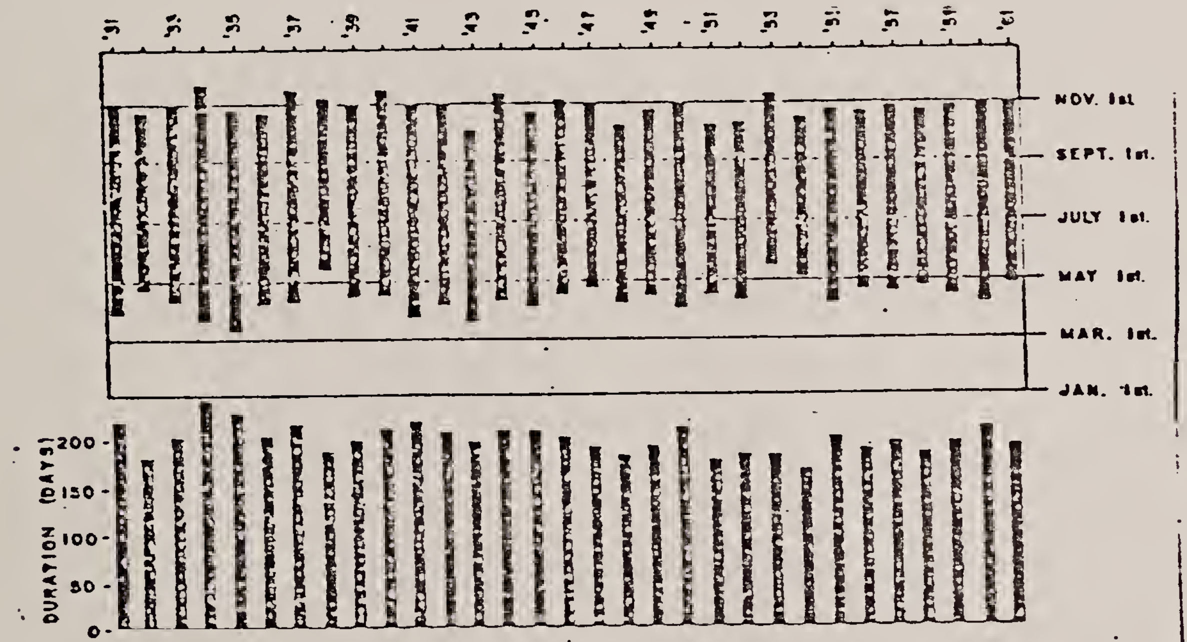
1. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS: SOUTHEAST

2. Temperature

THE PLAINS: DURATION OF SEASON WITHOUT KILLING FROST



CLOVIS (1931-1961)

County	Station	Temperature					Killing frost average dates				Average precipitation													
		Length of record	January average	July average	Maximum	Minimum	Length of record	Last in spring	First in fall	Growing season¹	Length of record	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Curry	Bellview						12	Apr. 24	Oct. 18	177	18	.31	.30	.58	.86	2.70	2.38	2.74	2.81	1.95	1.61	.58	.41	[illegible]
	Clovis	27	36.9	78.7	109	−11	20	Apr. 15	Oct. 29	197	28	.33	.44	.70	1.37	2.25	2.76	2.56	2.90	2.40	1.64	.50	.52	[illegible]
	Field (near)										14	.25	.39	.69	.96	2.09	2.11	2.48	3.09	1.81	2.10	.58	.46	[illegible]
	Melrose										29	.34	.39	.77	1.25	1.81	2.12	2.26	2.55	2.13	1.33	.64	.57	[illegible]
	St. Vrain (near)										27	.39	.43	.79	1.34	2.10	2.28	2.40	2.42	1.99	1.49	.84	.60	[illegible]
Roosevelt	Elida										26	.27	.30	.62	1.10	1.69	2.08	2.19	2.44	2.20	1.17	.50	.46	[illegible]
	Portales	31	37.0	77.0	109	−28	28	Apr. 15	Oct. 22	190	32	.25	.39	.81	1.32	2.27	2.33	2.52	2.80	2.28	1.29	.66	.63	[illegible]
	Richland (near)	24	38.7	76.4	109	−29	24	Apr. 18	Oct. 27	192	25	.28	.29	.62	.96	1.61	2.04	2.29	2.14	2.16	1.24	.55	.48	[illegible]
	Texico (near)										18	.28	.45	.76	1.96	1.76	2.93	2.23	2.52	2.51	1.81	.50	.81	[illegible]
	Valley View										16	.30	.31	.55	.75	1.65	1.52	2.20	2.16	1.79	1.60	.41	.40	[illegible]
Lea	Hobbs	19	41.0	79.3	109	−5	20	Apr. 10	Nov. 3	207	21	.26	.31	.61	1.03	1.13	2.60	1.65	3.01	2.30	1.79	.43	.50	[illegible]
	Lovington	27	42.1	78.1	107	−10	28	Apr. 5	Oct. 31	209	31	.29	.48	.56	.72	1.34	1.65	2.06	2.31	2.37	1.59	.51	.46	[illegible]
	Pearl (near)	14	39.5	78.4	107	−30	21	Apr. 12	Nov. 2	204	23	.43	.45	.61	.94	1.28	1.37	1.54	2.11	2.25	1.45	.43	.47	[illegible]
	Plainview						23	do	Oct. 29	200	27	.40	.55	.63	.99	1.55	1.82	1.83	2.27	2.42	1.45	.51	.63	[illegible]
	Tatum	16	38.7	77.1	108	−32	12	Apr. 17	Oct. 28	194	20	.36	.51	.67	.75	1.79	1.88	2.35	2.73	2.42	1.19	.49	.54	[illegible]

LATITUDE: 32° 42' N
LONGITUDE: 103° 08' W
ELEV. (GROUND): 3615 Ft.

CLIMATOLOGICAL SUMMARY

STATION: HOBBS
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1921 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes				Mean degree days				Snow, Sleet					Precip. .10 inch or more	Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year		Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year		90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	56.4	27.0	41.7	83	1953	- 3	1948+	720	0.46	1.01	1944	1.4	7.7	1948	4.5	1944	1	0	1	23	*	Jan.
Feb.	61.0	30.8	45.9	87	1940+	- 1	1951	530	0.38	0.87	1921	0.5	3.0	1924+	3.0	1924	1	0	1	17	*	Feb.
Mar.	67.5	35.8	51.6	93	1946	1	1922	420	0.40	0.95	1941	1.0	10.0	1958	6.5	1941	1	*	*	11	0	Mar.
Apr.	76.5	45.1	60.8	98	1928♦	17	1939	170	0.89	1.87	1926	0.3	8.0	1942	8.0	1942	2	2	0	2	0	Apr.
May	84.3	54.1	69.2	107	1951	34	1938	10	1.97	4.10	1947	0	0	--	0	--	3	8	0	0	0	May
June	92.7	63.2	77.9	110	1960+	37	1939	0	1.67	4.04	1921	0	0	--	0	--	3	22	0	0	0	June
July	93.0	65.6	79.4	110	1958	47	1939	0	2.09	3.53	1960	0	0	--	0	--	3	24	0	0	0	July
Aug.	92.8	65.7	79.1	107	1952	45	1939	0	1.73	2.80	1932♦	0	0	--	0	--	3	24	0	0	0	Aug.
Sept.	86.9	58.8	72.9	109	1939	34	1948	0	2.26	4.62	1950	0	0	--	0	--	3	12	0	0	0	Sept.
Oct.	76.6	48.2	62.5	98	1947	23	1925	140	1.93	2.62	1960	T	T	1958	T	1958	3	2	0	*	0	Oct.
Nov.	65.4	35.1	50.3	88	1952	9	1957+	440	0.37	0.78	1940	0.2	4.0	1944	2.0	1944	1	0	*	11	0	Nov.
Dec.	57.9	29.0	43.3	84	1922	1	1926+	670	0.53	1.86	1942	1.4	8.0	1960	5.0	1960+	1	0	1	21	0	Dec.
Year	75.9	46.5	61.2	110	June 1960+	- 3	Jan. 1948+	3100	14.68	4.62	Sept. 1950	4.8	10.0	Mar. 1958	8.0	Apr. 1942	25	95	3	85	*	Year

LATITUDE: 34° 10' N
LONGITUDE: 103° 21' W
ELEV. (GROUND): 4010 Ft.

CLIMATOLOGICAL SUMMARY

STATION: PORTALES
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1931 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes				Mean degree days				Snow, Sleet					Precip. .10 inch or more	Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year		Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year		90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	52.6	21.4	37.3	80	1950	-18	1947	860	0.46	1.08	1939	2.5	11.0	1936	5.0	1947+	1	0	2	28	1	Jan.
Feb.	58.0	25.3	41.8	83	1950	-28	1933	650	0.36	0.78	1948	1.1	4.2	1938	4.0	1960	1	0	1	22	*	Feb
Mar.	65.4	30.7	48.2	92	1946	5	1947+	520	0.54	1.15	1933	0.9	6.0	1934+	6.0	1934	1	*	*	18	0	Mar
Apr.	74.6	39.9	57.2	98	1937	11	1945	250	0.77	1.50	1940+	0.4	3.0	1940	3.0	1940	2	1	0	5	0	Apr.
May	81.9	50.3	66.1	102	1938	29	1954+	60	2.42	3.30	1957	0	0	--	0	--	4	5	0	*	0	May
June	91.0	59.0	75.2	106	1957	37	1955	0	2.41	4.00	1941	0	0	--	0	--	4	18	0	0	0	June
July	92.6	62.7	77.6	107	1940	51	1952+	0	2.93	4.36	1948	0	0	--	0	--	4	23	0	0	0	July
Aug.	91.5	61.5	76.5	105	1944	47	1944	0	2.66	5.15	1952	0	0	--	0	--	4	21	0	0	0	Aug
Sept.	84.8	54.3	69.5	104	1945	31	1945	30	1.81	2.10	1941	0	0	--	0	--	3	9	0	*	0	Sep
Oct.	74.9	42.6	58.9	93	1959+	22	1949	220	1.50	2.47	1960	0.2	4.0	1936	4.0	1936	3	*	0	3	0	Oct
Nov.	62.7	28.8	45.7	90	1950	4	1952+	580	0.45	0.92	1934	0.7	6.0	1931	5.0	1931	1	0	*	20	0	Nov
Dec.	54.9	23.4	39.1	78	1958	- 9	1939	800	0.58	1.45	1943	2.5	11.5	1931	6.0	1960	2	0	1	28	*	Dec
Year	73.7	41.7	57.7	107	July 1940	-28	Feb. 1933	3970	16.99	5.15	Aug. 1952	8.3	11.5	Dec. 1931	6.0	Dec. 1960+	30	77	4	124	1	Year

*Less than one half.

**Base 65° F (estimated).

(a) Average length of record, years.

T Trace, an amount too small to measure.

+ Also on earlier dates, months, or years.

♦ Partial year's record considered.

CLIMATE OF PORTALES, NEW MEXICO

C. 3. Continued

The frost-free season ranges from 190 to 210 days between early April and early November. Nearly 85 percent of the average annual 13.5 to 18.5 inches of precipitation falls during this frost-free period. Most rainfall occurs as brief and frequently heavy thundershowers, occasionally accompanied by hail and favors the growth of native, perennial, warm-season vegetation. A minor amount of precipitation falls as snow in the winter and usually melts within a few hours. Practically all moisture received in this area originates in the Gulf of Mexico. Occasionally an upslope movement of moist air from the Gulf results in steady, prolonged rains but these are rare and usually occur in the spring or fall, benefitting the minority population of cool-season plants.

4. Strong winds from the south and southwest prevail from February through May. This accelerates drying of the surface soil during a time when it is normally low in moisture and also when relative humidity is the lowest. The wind blows from the south more often than from any other direction. The average hourly wind velocity is about 12 miles per hour throughout the year. In the northern end of HP-3 occasional upslope movements of air in the winter may produce low cloudiness, rain and icing for several hours at a time.

D. SOILS

1. These are excessively drained, deep soils. Textures throughout the profile are typically fine sand. Permeability is rapid. The available water capacity is low. The effective rooting depth is greater than 60 inches. The plant-soil-air-water relationship is good. If unprotected by plant cover and organic residues these soils become wind blown and easily eroded, resulting in unstable, mobile dunes.

2. SOIL TAXONOMIC UNITS INCLUDED IN THIS SITE

Representative soils are:

Tivoli fine sand

E. POTENTIAL NATURAL PLANT COMMUNITY

The aspect of the potential natural plant community of this site is that of a tall grass prairie dominated by sand bluestem, giant sandreed, Indiangrass, and little bluestem. Scattered shrubs such as small soapweed, southwest rabbitbrush, sand plum, skunkbush sumac and sand sagebrush are inconspicuous. An understory of mid and short grasses, perennial and annual forbs is also present, fully occupying the wetted soil profile. Forb populations fluctuate widely from year to year with amount and seasonal distribution of rainfall. Tall grass and shrub populations are more constant and vary with longer term moisture cycles. In general, the north and east slopes are cooler and more moist, sometimes having a few cool-season grasses and an overall denser ground cover. The south and west slopes are warmer and drier.

E. Continued

2. Composition of Potential Plant Community

Expressed as approximate percentage of total, annual, air-dry vegetative production.

Grasses and Grasslike plants	75-90	Woody-Shrubs, Half-Shrubs, Vines and Trees	5-10	Forbs	5-20
Sand bluestem	25-30	Sand plum	3-5	Dotted gayfeather	2-5
		Southwest rabbitbrush		Wooly dalea	
Little bluestem	20-25	Skunkbush sumac		Silky prairieclover	
				Indian blanket	
Giant sandreed	10-15	Small soapweed	2-5	Prairie dogbane	
		Sand sagebrush		Lemon scurfpea	
Indiangrass	1-2	Shinnery oak		Germander	
				Gilia penstemon	
Giant dropseed	1-2			Lemon beebalm	
				Upright prairie coneflower	
New Mexico feathergrass	3-5				
Needle-and-thread					
Sand paspalum				Plains blackfoot	1-5
				Paperflower	
Hall's panicum	5			Smooth four-o-clock	
Fall witchgrass				Ground cherry	
Hairy grama				Hopitea greenthread	
Red lovegrass				Lanceleaf sage	
S[illegible] dropseed				Hairy goldaster	
Threeawns	5			Wooly gaura	1-5
Tumblegrass				Phlox heliotrophe	
Tumble lovegrass				Croton	
Gummy lovegrass				Queensdelight	
Field sandbur				Southern jointweed	
Other annual grasses				Bipinnate thistle	
				Western ragweed	
Flatsedge	1				
				Annual sunflower	1-5
				Annual wild buckwheat	
				Cocklebur	
				Cycloloma	
				Coriospermum	

E. Continued

3. Ground Cover (Percent of Surface Area)

Grasses and Forbs - Plant Density	28%
Shrubs and Half-shrubs - Canopy	2%
Bare ground	10%
Surface gravel	0%
Surface cobble and stones	0%
Litter - percent of area	60%
Litter - average depth in cm.	> 3 cm.

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air Dry)

Favorable Years	2400 lbs/acre
Median Years	2000 lbs/acre
Unfavorable Years	1400 lbs/acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It is most suitable for grazing by mature cattle due to the high composition of tall grasses and other coarse forage and browse. Sheep do not do well on this site. If protection from, or control of predators can be provided it would also accomodate minority proportions of goats. Grazing by goats would also be of value to control brush where woody plants have increased considerably or invaded. In general, cattle grazing will result in a decrease of palatable grasses and an increase in shrubs and undesirable forbs. Continuous, yearlong grazing or grazing continually during the potential growing season will result in a decrease in the vigor and abundance of sand bluestem, Indiangrass, giant sandreed, sand paspalum, and little bluestem. A corresponding increase will occur in dropseeds, threeawns, field sandbur, shinnery oak, small soapweed, yucca, and weedy forbs. Eventually these will dominate the site leaving it depleted in productivity, grazing value and vulnerable to wind erosion. Well planned systems of deferred grazing which vary the seasons of grazing and rest in pastures during successive years, will result in a balanced plant community providing higher quality forage and browse during all seasons of the year.

2. Wood Products

The natural potential plant community of this site affords little or no wood products of value. Where the site has deteriorated to brushy species, yucca stalks and the exposed roots and lower stems of shinnery oak, skunkbush sumac and sand plum provide attractive materials for dried flower arrangements, "driftwood", small novelty furniture and other curiosities.

3. Habitat for Wildlife

(To be completed by biologist)

4. Hydrological Interpretations

The hydrologic groups for soils in this site are as follows:

Soil Series	Hydrologic Group
Tivoli	A

The hydrologic curve number when vegetative ground cover is in high condition is about 39 for these A soils.

G. Continued

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, quail and dove hunting, antelope hunting and predator hunting. The site is also attractive to dune buggying; however, this activity is destructive to the native vegetation which stabilizes the dunes and will render them unstable. Care must be taken to confine the area of activity and control soil loss or use areas which are already unstable and exercise adequate controls to keep them from spreading.

During years of abundant spring moisture this site displays wildflowers in a wide spectrum of colors from May through August. A few fall blooming flowers also occur. If moisture is confined to the summer rainy period only, the view of a virtual "sea of grass" portrayed by waves of head-high sand bluestem, will be rewarding to those who appreciate a tall grass prairie.

6. Endangered Plants and Animals

There are presently no known endangered plants which are a part of the natural potential plant community of this site. As these become known, they will be added to this section.

(Endangered animal portion to be completed by biologist)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rates

Condition Class	% Potential Vegetation	Animal Acres per Unit Month
Excellent	100 - 76	2.2 - 3.1
Good	75 - 51	3.0 - 4.8
Fair	50 - 26	5.0 - 8.5
Poor	25 - 0	9.0 + +

H. Continued

2. Relative Quality of Plants for Animal Use[1/]

(a) Cattle

Primary	Secondary	Low Value
Sand bluestem	Hall's panicum	Threeawns
Little bluestem	Fall witchgrass	Tumblegrass
Giant sandreed	Hairy grama	Tumble lovegrass
Indiangrass	Red lovegrass	Gummy lovegrass
Giant dropseed	Sand dropseed	Field sandbur
New Mexico feathergrass	Flatsedge	Other annual grasses
Needleandthread	Wooly dalea	Paperflower
Sand paspalum	Silky prairieclover	Hairy goldaster
Dotted gayfeather	Indian blanket	Croton
Gilia penstemon	Prairie dogbane	Queensdelight
Plains blackfoot	Lemon scurfpea	Southern jointweed
Hopitea greenthread	Germander	Bipinnate thistle
Phlox heliotrophe	Lemon beebalm	Western ragweed
Annual sunflower	Upright prairie coneflower	Annual wild buckwheat
Sand plum	Smooth four-o'clock	Cocklebur
	Ground cherry	Cycloloma
	Lanceleaf sage	Coriospermum
	Wooly gaura	Southwest rabbitbrush
	Skunkbush sumac	
	Small soapweed	
	Sand sagebrush	
	Shinnery oak	

1/ See Attachment #1, "Legends and Definitions for Range Site Descriptions"

H. 2. Continued

(b) Goats

Primary

Sand plum
Shinnery oak
Southwest rabbitbrush
Skunkbush sumac
Sand sagebrush
Gilia penstemon
Phlox heliotrophe
Croton

Secondary

Dotted gayfeather
Wooly dalea
Silky prairieclover
Indian blanket
Prairie dogbane
Lemon scurfpea
Germander
Lemon beebalm
Upright prairie coneflower
Plains blackfoot
Paperflower
Smooth four-o'clock
Ground cherry
Hopitea greenthread
Lanceleaf sage
Hairy goldaster
Wooly gaura
Queensdelight
Southern jointweed
Bipinnate thistle
Annual sunflower
Annual wild buckwheat
Needleandthread
New Mexico feathergrass
Hall's panicum
Fall witchgrass
Hairy grama

Low Value

Small soapweed
Western ragweed
Cocklebur
Cycloloma
Coriospermum
Sand bluestem
Little bluestem
Giant sandreed
Indiangrass
Giant dropseed
Sand paspalum
Red lovegrass
Sand dropseed
Threeawns
Tumblegrass
Tumble lovegrass
Gummy lovegrass
Field sandbur
Flatsedge
Other annual grasses

H. 2. Continued

(c) Antelope

Primary

Dotted gayfeather
Wooly dalea
Indian blanket
Prairie dogbane
Germander
Gilia penstemon
Upright prairie coneflower
Plains blackfoot
Paperflower
Smooth four-o'clock
Ground cherry
Hopitea greenthread
Lanceleaf sage
Phlox heliotrophe
Croton Annual sunflower
Annual wild buckwheat
Fall witchgrass
Sand paspalum
New Mexico feathergrass
Needleandthread

Secondary

Silky prairieclover
Lemon scurfpea
Lemon beebalm
Hairy goldaster
Wooly gaura
Queensdelight
Southern jointweed
Sand plum
Southwest rabbitbrush
Sand sagebrush
Shinnery oak
Skunkbush sumac
Sand bluestem
Little bluestem
Indiangrass
Red lovegrass
Giant sandreed
Giant dropseed
Hall's panicum
Sand dropseed

Low Value

Bipinnate thistle
Western ragweed
Cocklebur
Cycloloma
Coriospermum
Small soapweed
Hairy grama
Threeawns
Flatsedge
Tumblegrass
Tumble lovegrass
Gummy lovegrass
Field sandbur
Other annual grasses

H. 2. Continued

(d) Quail and Dove

Primary

Silky prairieclover
Lemon scurfpea
Gilia penstemon
Plains blackfoot
Groundcherry
Phlox heliotrophe
Croton
Western ragweed
Annual sunflower
Cycloloma
Coriospermum
Sand plum
Skunkbush sumac
Sand paspalum

Secondary

Dotted gayfeather
Indian blanket
Prairie dogbane
Germander
Upright prairie coneflower
Smooth four-o'clock
Hopitea greenthread
Wooly gaura
Queens delight
Southern jointweed
Annual wild buckwheat
Southwest rabbitbrush
Shinnery oak
Giant dropseed
Hall's panicum
Sand dropseed
Other annual grasses

Low Value

Wooly dalea
Lemon beebalm
Paperflower
Lanceleaf sage
Hairy goldaster
Bipinnate thistle
Cocklebur
Small soapweed
Sand sagebrush
Sand bluestem
Little bluestem
Giant sandreed
Indiangrass
New Mexico feathergrass
Needleandthread
Fall witchgrass
Hairy grama
Red lovegrass
Threeawns
Tumblegrass
Tumble lovegrass
Gummy lovegrass
Flatsedge
Field sandbur

I. IDENTIFICATION AND AUTHORIZATION

1. U.S.D.A. Soil Conservation Service
   New Mexico State Office, Albuquerque, New Mexico
   High Plains, MLRA-77

2. Field Offices Where Site Occurs

   Portales
   Clovis
   Tucumcari
   Lovington

3. Best Example Location in Sub-Resource Area

   Roosevelt County, New Mexico, N½, SE¼ Section 12, T. 1 S., R. 34 E., NMPM. Roosevelt County Soil Survey Map Sheet #43. W. R. Bauske Ranch. Tf mapping unit, Tivoli fine sand.

4. Site Approval:

______________________________ ________
State Range Conservationist Date

______________________________ ________
Regional Range Conservationist Date

Attachment #1

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing.

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plants listed.

DRAFT
9/13/77
Noel Marsh

A. SITE NUMBER HP-77-55 TxN Sandy HP-3

B. PHYSIOGRAPHIC FEATURES

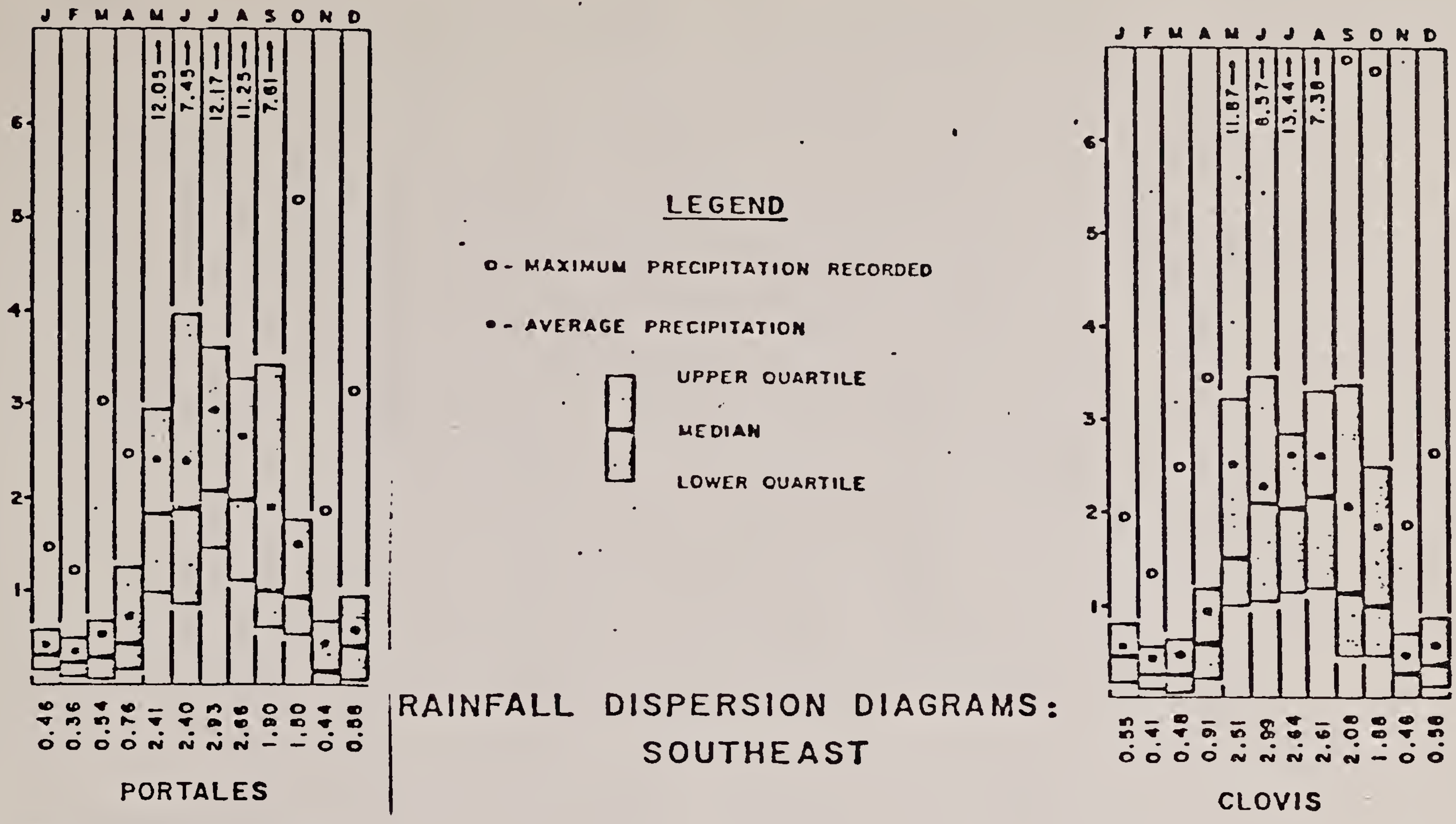
1. This site occurs on level to undulating landscapes on upland plains, namely the high plains of southeastern New Mexico and adjacent west Texas.
2. Slopes may range from 0 to 5 percent but are usually less than 3 percent. Direction of slope varies and is not significant.
3. Elevations range from 3,550 to 4,300 feet.

C. CLIMATIC FEATURES

The climate of this area is classified as semi-arid, continental, characterized by warm summers, cool, dry winters, and abundant sunshine. About 75 percent of the possible sunshine is received throughout the year.

C. CLIMATIC FEATURES

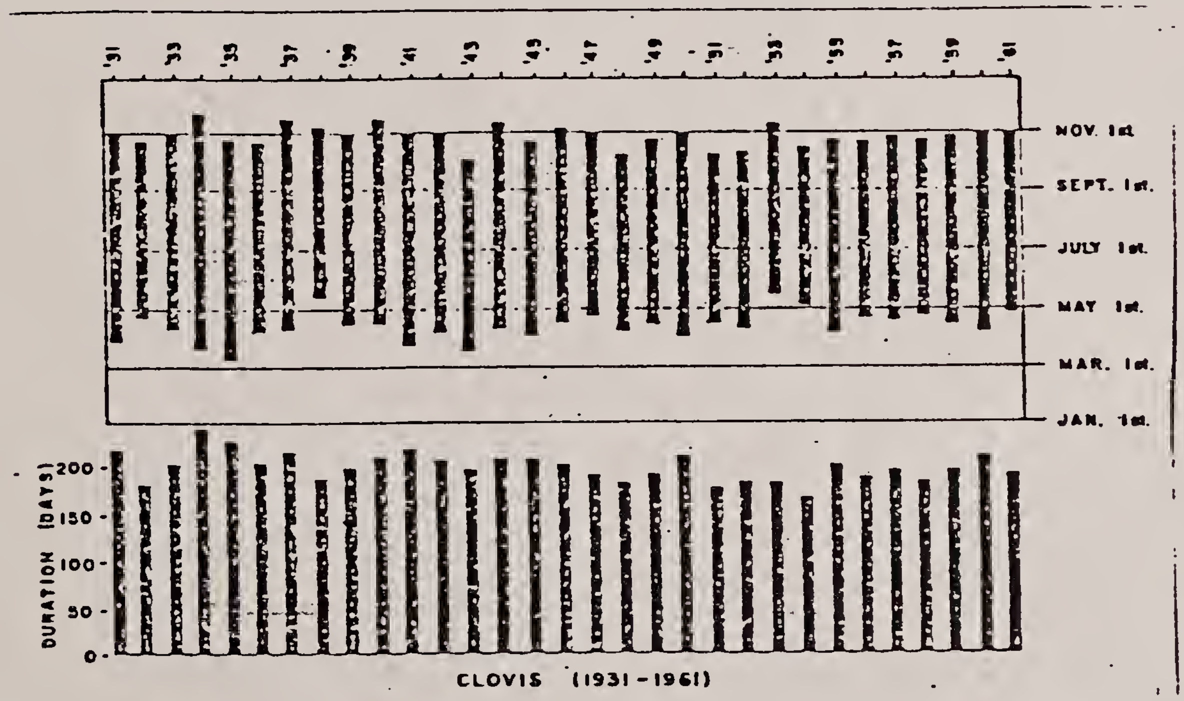
1. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS: SOUTHEAST

2. Temperature

THE PLAINS: DURATION OF SEASON WITHOUT KILLING FROST



County	Station	Temperature					Killing frost average dates				Average precipitation													
		Length of record	January average	July average	Maximum	Minimum	Length of record	Last in spring	First in fall	Growing season	Length of record	January	February	March	April	May	June	July	August	September	October	November	December	Annual
rry	Bellview						12	Apr. 24	Oct. 18	177	18	.31	.30	.58	.86	2.70	2.38	2.74	2.81	1.95	1.61	.58	.41	17.23
	Clovis	27	36.0	78.7	109	-11	26	Apr. 15	Oct. 29	197	28	.33	.44	.70	1.37	2.25	2.76	2.56	2.90	2.46	1.64	.50	.52	18.43
	Field (near)										14	.25	.39	.69	.96	2.09	2.11	2.48	3.09	1.81	2.10	.58	.46	17.01
	Melrose										29	.34	.39	.77	1.25	1.81	2.12	2.26	2.55	2.13	1.33	.64	.57	16.19
	St. Vrain (near)										27	.39	.43	.79	1.34	2.10	2.28	2.40	2.42	1.99	1.49	.54	.60	16.77
oosevelt	Elida										26	.27	.30	.62	1.10	1.69	2.08	2.19	2.44	2.20	1.17	.50	.46	15.62
	Portales	31	37.0	77.0	109	-28	28	Apr. 15	Oct. 22	190	32	.25	.39	.84	1.32	2.27	2.33	2.52	2.80	2.28	1.29	.66	.63	17.58
	Richland (near)	24	38.7	76.4	109	-29	24	Apr. 18	Oct. 27	192	25	.28	.29	.62	.96	1.61	2.04	2.29	2.14	2.16	1.24	.55	.48	14.57
	Texico (near)										18	.28	.45	.76	1.96	1.76	2.93	2.21	2.52	2.51	1.81	.50	.80	18.54
	Valley View										16	.30	.31	.65	.75	1.65	1.52	2.20	2.16	1.79	1.60	.41	.46	13.70
ea	Hobbs	19	41.0	79.3	109	-5	20	Apr. 10	Nov. 3	207	21	.26	.31	.61	1.03	1.13	2.60	1.65	3.01	2.30	1.79	.43	.56	15.68
	Lovington	27	42.1	78.1	107	-10	28	Apr. 8	Oct. 31	209	31	.29	.48	.56	.72	1.34	1.65	2.06	2.31	2.37	1.59	.51	.46	14.34
	Pearl (near)	14	39.5	78.4	107	-30	21	Apr. 12	Nov. 2	204	23	.43	.45	.61	.94	1.28	1.37	1.54	2.11	2.25	1.45	.43	.47	13.33
	Plainview						23	do	Oct. 29	200	27	.40	.55	.63	.99	1.55	1.82	1.83	2.27	2.42	1.45	.51	.65	15.07
	Tatum	16	38.7	77.1	108	-32	12	Apr. 17	Oct. 28	194	20	.36	.51	.67	.75	1.79	1.84	2.35	2.73	2.42	1.19	.49	.54	15.68

C.

3.

LATITUDE: 32° 42' N
LONGITUDE: 103° 08' W
ELEV. (GROUND): 3615 Ft.

CLIMATOLOGICAL SUMMARY

STATION: HOBBS
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1921 - 1960

Month	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					Month
	Means			Extremes				Mean degree days	Mean	Greatest daily	Year	Snow, Sleet					Precip. .10 inch or more	Temperatures				
																		Max.		Min.		
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year					Mean	Maximum monthly	Year	Greatest daily	Year		90° and above	32° and below	32° and below	0° and below	
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	56.4	27.0	41.7	83	1953	- 3	1948+	720	0.46	1.01	1944	1.4	7.7	1948	4.5	1944	1	0	1	23	*	Jan.
Feb.	61.0	30.8	45.9	87	1940+	- 1	1951	530	0.38	0.87	1921	0.5	3.0	1924+	3.0	1924	1	0	1	17	*	Feb.
Mar.	67.5	35.8	51.6	93	1946	1	1922	420	0.40	0.95	1941	1.0	10.0	1958	6.5	1941	1	*	*	11	0	Mar.
Apr.	76.5	45.1	60.8	98	1928♦	17	1939	170	0.89	1.87	1926	0.3	8.0	1942	8.0	1942	2	2	0	2	0	Apr.
May	84.3	54.1	69.2	107	1951	34	1938	10	1.97	4.10	1947	0	0	--	0	--	3	9	0	0	0	May
June	92.7	63.2	77.9	110	1960+	37	1939	0	1.67	4.04	1921	0	0	--	0	--	3	22	0	0	0	June
July	93.0	65.6	79.4	110	1958	47	1939	0	2.09	3.53	1960	0	0	--	0	--	3	24	0	0	0	July
Aug.	92.8	65.7	79.1	107	1952	45	1939	0	1.73	2.80	1932♦	0	0	--	0	--	3	24	0	0	0	Aug.
Sept.	86.9	58.8	72.9	109	1939	34	1948	0	2.26	4.62	1950	0	0	--	0	--	3	12	0	0	0	Sept.
Oct.	76.6	48.2	62.5	88	1947	23	1925	140	1.93	2.62	1960	T	T	1958	T	1958	3	2	0	*	0	Oct.
Nov.	65.4	35.1	50.3	88	1952	9	1957+	440	0.37	0.78	1940	0.2	4.0	1944	2.0	1944	1	0	*	11	0	Nov.
Dec.	57.9	29.0	43.3	84	1922	1	1926+	670	0.53	1.86	1942	1.4	8.0	1960	5.0	1960+	1	0	1	21	0	Dec.
Year	75.9	46.5	61.2	110	June 1960+	- 3	Jan. 1948+	3100	14.68	4.62	Sept. 1950	4.8	10.0	Mar. 1958	8.0	Apr. 1942	25	95	3	85	*	Year

LATITUDE: 34° 10' N
LONGITUDE: 103° 21' W
ELEV. (GROUND): 4010 Ft.

CLIMATOLOGICAL SUMMARY

STATION: PORTALES
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1931 - 1960

Month	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes				Mean degree days	Mean	Greatest daily	Year	Snow, Sleet					Precip. .10 inch or more	Temperatures				
																		Max.		Min.		
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year					Mean	Maximum monthly	Year	Greatest daily	Year		90° and above	32° and below	32° and below	0° and	
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	52.6	21.4	37.3	80	1950	-18	1947	860	0.46	1.08	1939	2.5	11.0	1936	5.0	1947+	1	0	2	28	1	Jan.
Feb.	58.0	25.3	41.8	83	1950	-28	1933	650	0.36	0.78	1948	1.1	4.2	1938	4.0	1960	1	0	1	22	*	Feb.
Mar.	65.4	30.7	48.2	92	1946	5	1947+	520	0.54	1.15	1933	0.9	6.0	1934+	6.0	1934	1	*	*	18	0	Mar.
Apr.	74.6	39.9	57.2	98	1937	11	1945	250	0.77	1.50	1940+	0.4	3.0	1940	3.0	1940	2	1	0	5	0	Apr.
May	81.9	50.3	66.1	102	1938	29	1954+	60	2.42	3.30	1957	0	0	--	0	--	4	5	0	*	0	May
June	91.0	59.0	75.2	106	1957	37	1955	0	2.41	4.00	1941	0	0	--	0	--	4	18	0	0	0	June
July	92.6	62.7	77.6	107	1940	51	1952+	0	2.93	4.36	1948	0	0	--	0	--	4	23	0	0	0	July
Aug.	91.5	61.5	76.5	105	1944	47	1944	0	2.66	5.15	1952	0	0	--	0	--	4	21	0	0	0	Aug.
Sept.	84.8	54.3	69.5	104	1945	31	1945	30	1.91	2.10	1941	0	0	--	0	--	3	9	0	*	0	Sept.
Oct.	74.9	42.6	58.9	93	1959+	22	1949	220	1.50	2.47	1960	0.2	4.0	1936	4.0	1936	3	*	0	3	0	Oct.
Nov.	62.7	28.8	45.7	90	1950	4	1952+	580	0.45	0.92	1934	0.7	6.0	1931	5.0	1931	1	0	*	20	0	Nov.
Dec.	54.9	23.4	39.1	78	1958	- 9	1939	800	0.58	1.45	1943	2.5	11.5	1931	6.0	1960	2	0	1	28	*	Dec.
Year	73.7	41.7	57.7	107	July 1940	-28	Feb. 1933	3970	16.99	5.15	Aug. 1952	8.3	11.5	Dec. 1931	6.0	Dec. 1960+	30	77	4	124	1	Year

*Less than one half.
**Base 65° F (estimated).
(a) Average length of record, years.

T Trace, an amount too small to measure.
+ Also on earlier dates, months, or years.
♦ Partial year's record considered.

CLIMATE OF PORTALES, NEW MEXICO

C. 3. Continued

The frost-free season ranges from 190 to 210 days between early April and early November. Nearly 85 percent of the average annual 13.5 to 18.5 inches of precipitation falls during this frost-free period. Most rainfall occurs as brief and frequently heavy thundershowers occasionally accompanied by hail and favors the growth of native, perennial, warm-season vegetation. A minor amount of precipitation falls as snow in the winter and usually melts within a few hours. Practically all moisture received in this area originates in the Gulf of Mexico. Occasionally an upslope movement of moist air from the Gulf results in steady, prolonged rains but these are rare and usually occur in the spring or fall, benefitting the minority population of cool-season plants.

4. Strong winds from the south and southwest prevail from February through May. This accelerates drying of the surface soil during a time when it is normally low in moisture and also when relative humidity is the lowest. The wind blows from the south more often than from any other direction. The average hourly wind velocity is about 12 miles per hour throughout the year. In the northern end of HP-3 occasional upslope movements of air in the winter may produce low cloudiness, rain and icing for several hours at a time.

D. SOILS

1. These are well drained, moderately deep to shallow soils over calcic or petrocalcic layers. The surface textures are typically fine sandy loam. The textures of the subsurface layers are fine sandy loam, sandy clay loam, and clay loam. Depth to the calcic layers ranges from 20 inches to 50 inches. Depth to the petrocalcic layers ranges from 20 to 40 inches. Permeability is moderate to moderately rapid above the calcic and petrocalcic layers. The available water capacity is moderate to high. The effective rooting depth is typically 20 to 50 inches. The plant-soil-air-water relationship is good. The porous, sandy surface soils conduct moisture readily to the subsurface layers for storage and then act as a mulch, retarding evaporation. Early precipitation, falling before the growing season, can be stored in the subsoil for early greenup of plants as soon as air temperatures permit, without having to wait for growing season precipitation. Without protection by plant cover and organic residue these surface soils become wind blown and easily eroded and thereby exposing the subsoils to water erosion.

D. Continued

2. SOIL TAXONOMIC UNITS INCLUDED IN THIS SITE

Representative Soils Are:

Amarillo fine sandy loam
Arvana fine sandy loam
Gomez fine sandy loam

Other Soils Included Are:

Clovis fine sandy loam
Sharvana fine sandy loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential natural plant community of this site has the aspect of a mixed, mid and short grass prairie. It is dominated by grasses such as the gramas, little bluestem, dropseeds and plains bristlegrass with lesser amounts of forbs and shrubs evenly distributed. The perennial grass and perennial forb components remain fairly constant in relation to each other, with the total production of both increasing or decreasing in a parallel manner during wet or dry years and cycles. The woody component is relatively constant excluding fire or man induced disturbances. Response to dynamic climatic flux is exhibited by the annual grass and annual forb components which fluctuate somewhat from year to year with annual and seasonal variation in amount and distribution of rainfall.

E. 2. Composition of Potential Plant Community

Expressed as approximate percentage of total, annual, air-dry vegetative production.

Grasses and Grasslike plants	75-85%	Woody shrubs, half-shrubs, vines and trees	5-10%	Forbs	10-15%
Sideoats grama	20-25	Small soapweed Winterfat Mormon-tea	3-5	Dotted gayfeather Indian blanket Silky prairieclover Globemallow Penstemon Upright prairie coneflower Birdbill dayflower Verbena Germander Indian rushpea Lanceleaf sage Plains blackfoot Lemon scurfpea	3-5
Little bluestem Silver bluestem	5-10	Plains pricklypear Engelmann pricklypear	1-2	Hopitea greenthread Fleabane Paper flower Prickly poppy Buffalobur Wooly dalea Stickleaf Wavyleaf thistle Western ragweed	5
Plains bristlegrass Sand paspalum	3-5	Pale wolfberry Feather dalea Southwest rabbitbrush Broom snakeweed	1-3	Annual sunflower Other annual forbs	1-5
New Mexico feathergrass	1-3				
Blue grama	10-15				
Black grama	3-5				
Hairy grama Buffalograss F[illegible]itchgrass	3-5				
Red lovegrass Sand dropseed	3-5				
Threeawns Sand muhly	2-3				
Tumble windmillgrass Tumble lovegrass	2-3				
Field sandbur Other annual grasses	1-5				

E. 3. Ground Cover

	(Percent of Surface Area)
Grasses and forbs - plant density	40
Shrubs and half-shrubs - canopy	5
Bare ground	20
Surface gravel	0
Surface cobble and stones	0
Litter - percent of area	35
Av. depth in cm.	> 2 cm.

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air Dry)

Favorable Years	1500 lbs./acre
Median Years	1250 lbs./acre
Unfavorable Years	800 lbs./acre

G. SITE INTERPRETATIONS

1. Grazing

This site provides forage suitable for grazing during all seasons of the year. The site in itself lacks protective cover for livestock from winter storms. It is suitable for grazing by all classes of cattle, as well as minor proportions of sheep and goats where protection from, or control of predators can be provided. Because of the high percentage component of grasses, the site is best suited to animals which utilize grasses for a large percent of their diets, such as cattle. In general, cattle grazing will result in a decrease in grasses and palatable forbs and an increase in woody plants. Sheep grazing will result in a decrease in perennial forbs and an increase in unpalatable grasses and woody plants. Grazing by goats results in a decrease in browse and an increase in grasses. Continuous, year long grazing or grazing continually during the potential growing season will result in a decrease in the vigor and abundance of sideoats grama, little bluestem, plains bristlegrass, winterfat and Mormon-tea with a corresponding increase in yucca, pricklypear, field sandbur, ragweed, threeawns, and broom snakeweed. Eventually mesquite and wooly groundsel will invade the site and together with broom snakeweed, will severely impair the grazing value of the site. Well planned systems of deferred grazing by domestic livestock which vary the seasons of grazing and rest in pastures during successive years will result in a balanced plant community providing high quality forage and browse during all seasons of the year.

2. Wood Products

The natural potential plant community of this site affords little or no wood products of value.

3. Habitat for Wildlife

(To be completed by biologist)

G. Continued

4. Hydrological Interpretations

The hydrologic groups for soils in this site are as follows:

Soil Series	Hydrologic Group
Amarillo	B
Arvana	C
Clovis	B
Gomez	B
Sharvana	C

The hydrologic curve number when vegetative ground cover is in high condition is about 77 for C soils and 87 for D soils.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, quail and dove hunting, antelope hunting, and predator hunting. During years with abundant spring moisture, and continuing moisture throughout the growing season, this site displays a colorful array of wildflowers from May through September.

6. Endangered Plants and Animals

There are presently no known endangered plants which are a part of the natural potential plant community of this site. As these become known they will be added to this section.

(Endangered animal portion to be completed by biologist).

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rates

Condition Class	% Potential Vegetation	Acres per Animal Unit Month
Excellent	100 - 76	2.0 - 2.8
Good	75 - 51	2.7 - 4.1
Fair	50 - 26	4.5 - 6.5
Poor	25 - 0	7.0 +

H. 2. Relative Quality of Plants for Animal Use[1]

(a) Cattle

Primary	Secondary	Low Value
Sideoats grama	Silver bluestem	Threeawns
Little bluestem	Hairy grama	Sand muhly
Plains bristlegrass	Buffalograss	Tumble windmillgrass
Sand paspalum	Fall witchgrass	Tumble lovegrass
New Mexico feathergrass	Red lovegrass	Field sandbur
Blue grama	Sand dropseed	Other annual grasses
Black grama	Indian blanket	Paperflower
Dotted gayfeather	Silky prairieclover	Pricklypoppy
Globemallow	Upright Prairie coneflower	Buffalobur
Penstemon	Germander	Wavyleaf thistle
Birdbill dayflower	Lanceleaf sage	Western ragweed
Verbena	Lemon scurfpea	Plains pricklypear
Indian rushpea	Fleabane	Engelmann pricklypear
Plains blackfoot	Wooly dalea	Pale wolfberry
Hopitea greenthread	Stickleaf	Feather dalea
Annual sunflower	Other annual forbs	Southwest rabbitbrush
Winterfat	Small soapweed	Broom snakeweed
Mormon-tea		

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[1] See Attachment #1, "Legends and Definitions for Range Site Descriptions"

H. 2. Continued

(b) Sheep

Primary

- Dotted gayfeather
- Silky prairieclover
- Globemallow
- Penstemon
- Upright prairie coneflower
- Verbena
- Birdbill dayflower
- Germander
- Indian rushpea
- Lanceleaf sage
- Lemon scurfpea
- Hopitea greenthread
- Stickleaf
- Annual sunflower
- Other annual forbs
- Sideoats grama
- Plains bristlegrass
- Mormon-tea
- Sand paspalum
- Winterfat
- Blue grama
- Fall witchgrass
- Black grama
- Buffalograss
- Hairy grama

Secondary

- Indian blanket
- Plains blackfoot
- Fleabane
- Paperflower
- Wooly dalea
- Little bluestem
- Silver bluestem
- New Mexico feathergrass
- Red lovegrass
- Sand dropseed
- Other annual grasses
- Pale wolfberry
- Feather dalea
- Southwest rabbitbrush

Low Value

- Prickly poppy
- Buffalobur
- Wavyleaf thistle
- Western ragweed
- Threeawns
- Sand muhly
- Tumble windmillgrass
- Tumble lovegrass
- Field sandbur
- Small soapweed
- Plains pricklypear
- Engelmann pricklypear
- Broom snakeweed

H. 2. Continued

(c) Goats

Primary

Winterfat
Mormon-tea
Pale wolfberry
Feather dalea
Southwest rabbitbrush
Penstemon

Secondary

Broom snakeweed
Dotted gayfeather
Indian blanket
Silky prairieclover
Globemallow
Upright prairie coneflower
Birdbill dayflower
Verbena
Germander
Indian rushpea
Lanceleaf sage
Plains blackfoot
Lemon scurfpea
Hopitea greenthread
Fleabane
Fall witchgrass
Paperflower
Hairy grama
Prickly poppy
Black grama
Wooly dalea
New Mexico feathergrass
Stickleaf
Plains bristlegrass
Wavyleaf thistle
Sideoats grama
Annual sunflower
Other annual forbs

Low Value

Small soapweed
Plains pricklypear
Engelmann pricklypear
Buffalobur
Western ragweed
Little bluestem
Silver bluestem
Sand paspalum
Blue grama
Buffalograss
Red lovegrass
Sand dropseed
Threeawns
Sand muhly
Tumble windmillgrass
Tumble lovegrass
Field sandbur
Other annual grasses

H. 2. Continued

(d) Antelope

Primary

Dotted gayfeather
Indian blanket
Globemallow
Penstemon
Upright prairie coneflower
Birdbill dayflower
Verbena
Germander
Indian rushpea
Lanceleaf sage
Plains blackfoot
Hopitea greenthread
Fleabane
Paperflower
Wooly dalea
Stickleaf
Annual sunflower
Fall witchgrass
Winterfat
New Mexico feathergrass
Mormon-tea
Sand paspalum
Feather dalea
Plains bristlegrass
Broom snakeweed

Secondary

Silky prairieclover
Lemon scurfpea
Other annual forbs
Southwest rabbitbrush
Sideoats grama
Little bluestem
Silver bluestem
Blue grama
Black grama
Buffalograss
Red lovegrass
Sand dropseed
Other annual grasses

Low Value

Prickly poppy
Buffalobur
Wavyleaf thistle
Western ragweed
Small soapweed
Plains pricklypear
Engelmann pricklypear
Pale wolfberry
Hairy grama
Threeawns
Sand muhly
Tumble windmillgrass
Tumble lovegrass
Field sandbur

H. 2. Continued

(e) Quail and Dove

Primary

Silky prairieclover
Globemallow
Penstemon
Indian rushpea
Plains blackfoot
Lemon scurfpea
Western ragweed
Annual sunflower
Plains bristlegrass
Sand paspalum
Broom snakeweed

Secondary

Dotted gayfeather
Indian blanket
Upright prairie coneflower
Birdbill dayflower
Verbena
Germander
Hopitea greenthread
Stickleaf
Other annual forbs
Buffalograss
Sand dropseed
Other annual grasses
Winterfat
Mormon-tea
Pale wolfberry
Feather dalea

Low Value

Lanceleaf sage
Fleabane
Paperflower
Prickly poppy
Buffalobur
Wooly dalea
Wavyleaf thistle
Sideoats grama
Little bluestem
Silver bluestem
New Mexico feathergrass
Blue grama
Black grama
Hairy grama
Fall witchgrass
Red lovegrass
Threeawns
Feather dalea
Sand muhly
Engelmann pricklypear
Tumble windmillgrass
Plains pricklypear
Tumble lovegrass
Small soapweed
Field sandbur

I. IDENTIFICATION AND AUTHORIZATION

1. U.S.D.A. Soil Conservation Service
   New Mexico State Office, Albuquerque, N.M.
   High Plains, MLRA-77

2. Field Offices where site occurs:

   Lovington
   Portales
   Clovis
   Tucumcari

3. Best Example Location in Sub-Resource Area

   Roosevelt County, New Mexico, SE¼, SW¼, Section 19, T. 1 N., R. 36 E. 0.1 - 0.2 miles southeast of Highway by north gravel pit. "Go" mapping unit - Gomez fine sandy loam. Roosevelt Soil Survey Mapping Sheet #32.

4. SITE APPROVAL:

State Range Conservationist	Date
Regional Range Conservationist	Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing.

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plants listed.

DRAFT 9/9/77
Noel Marsh

A. Site Number HP-77-54-TxN Very Shallow HP-3

B. PHYSIOGRAPHIC FEATURES

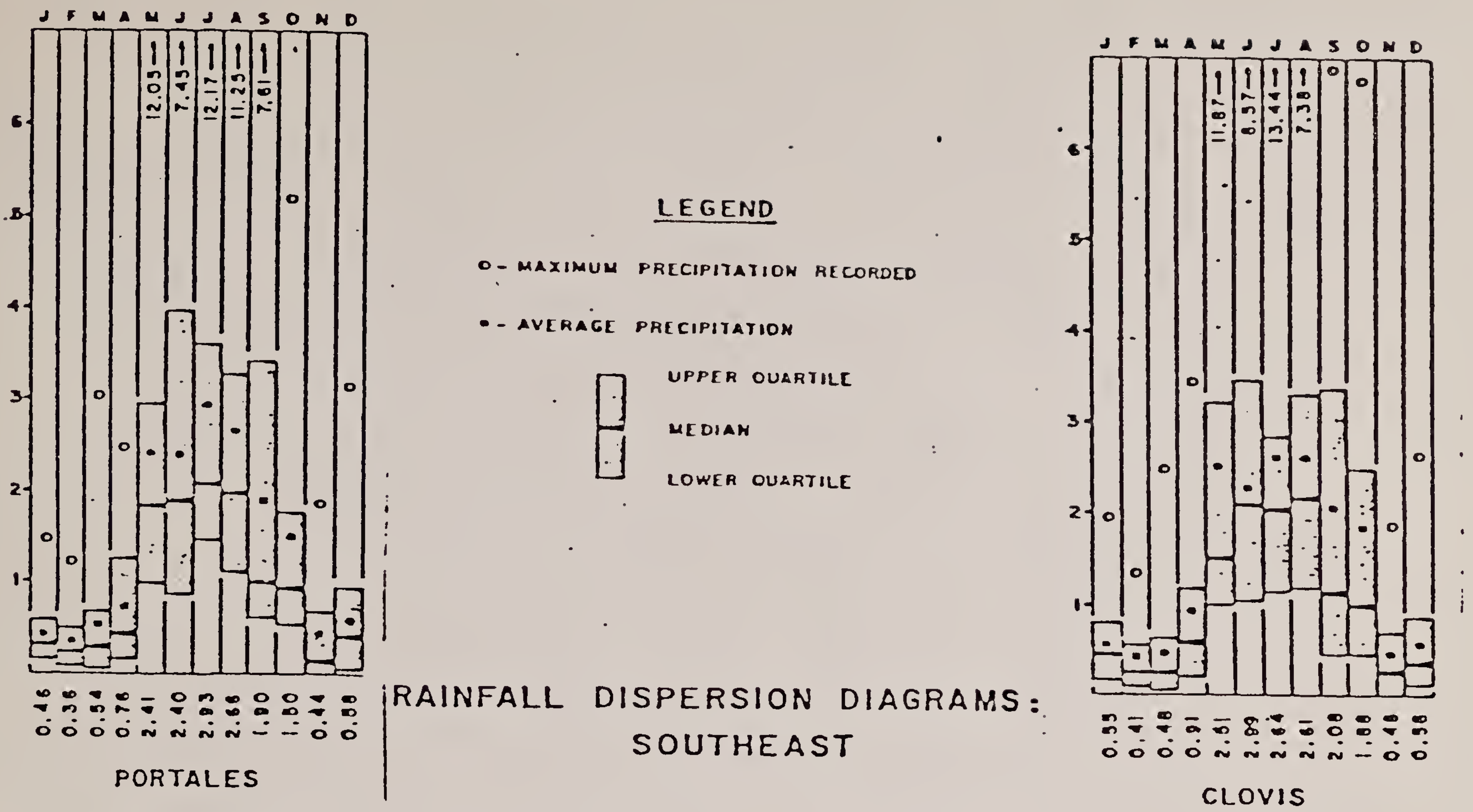
1. This site occurs on level plains to moderately sloping landscapes on the high plains of southeastern New Mexico and adjacent west Texas. It is normally found on the convex position of low ridges between deeper soils and swales.
2. Slopes may range from 0 to 9 percent but are usually less than 5 percent. Direction of slope varies and is not significant.
3. Elevations range from 3,550 to 4,300 feet.

C. CLIMATIC FEATURES

The climate of this area is classified as semi-arid continental, characterized by warm summers, cool, dry winters, and abundant sunshine. About 75 percent of the possible sunshine is received throughout the year.

C. CLIMATIC FEATURES

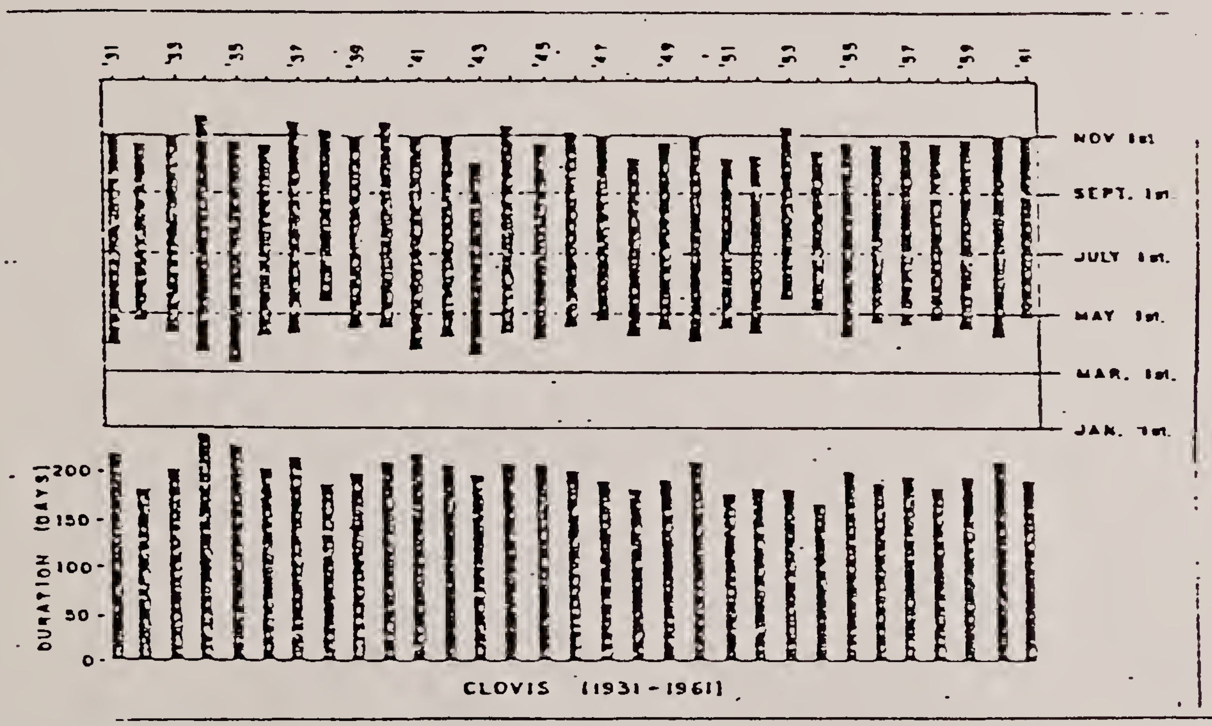
1. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS: SOUTHEAST

2. Temperature

THE PLAINS: DURATION OF SEASON WITHOUT KILLING FROST



CLOVIS (1931-1961)

County	Station	Temperature					Killing frost average dates				Average precipitation													
		Length of record	January average	July average	Maximum	Minimum	Length of record	Last in spring	First in fall	Growing season	Length of record	January	February	March	April	May	June	July	August	September	October	November	December	Annual
----------	Bellview	----	----	----	----	----	12	Apr. 24	Oct. 18	177	18	.31	.30	.58	.86	2.70	2.38	2.74	2.81	1.95	1.61	.58	.41	17.23
	Clovis	27	36.9	78.7	109	—11	26	Apr. 15	Oct. 29	197	28	.33	.44	.70	1.37	2.25	2.76	2.56	2.90	2.46	1.64	.50	.32	18.43
	Field (near)	----	----	----	----	----	----	----	----	----	14	.25	.39	.69	.96	2.09	2.11	2.48	3.09	1.81	2.10	.58	.46	17.01
	Melrose	----	----	----	----	----	----	----	----	----	29	.34	.39	.77	1.25	1.81	2.12	2.26	2.58	2.13	1.33	.64	.37	16.19
	St. Vrain (near)	----	----	----	----	----	----	----	----	----	27	.39	.43	.79	1.34	2.10	2.28	2.40	2.42	1.99	1.49	.64	.60	16.77
elt	Elida	----	----	----	----	----	----	----	----	----	26	.27	.30	.62	1.10	1.69	2.09	2.19	2.44	2.20	1.17	.50	.46	15.62
	Portales	31	37.0	77.0	109	—28	28	Apr. 15	Oct. 22	190	32	.25	.39	.84	1.32	2.27	2.33	2.52	2.80	2.28	1.29	.66	.63	17.58
	Richland (near)	24	35.7	76.4	109	—29	24	Apr. 18	Oct. 27	192	26	.28	.29	.62	.96	1.61	2.04	[illegible]	2.14	2.16	1.23	[illegible]	.48	14.57
	Texico (near)	----	----	----	----	----	----	----	----	----	18	.28	.45	.76	1.06	1.76	2.93	2.23	2.52	2.51	1.81	.50	.81	18.54
	Valley View	----	----	----	----	----	----	----	----	----	16	.20	.31	.55	.75	1.65	1.52	2.20	2.16	1.79	1.60	.41	.46	13.70
----------	Hobbs	19	41.0	79.3	109	—[illegible]	20	Apr. 10	Nov. 3	207	21	.26	.31	.61	1.03	1.13	2.60	1.65	3.01	2.30	1.79	.43	.56	15.68
	Lovington	27	42.1	78.1	107	—10	28	Apr. 5	Oct. 31	209	31	.29	.48	.56	.72	1.34	1.65	2.06	2.31	2.37	1.59	.51	.46	14.34
	Pearl (near)	14	39.5	78.4	107	—30	21	Apr. 12	Nov. 2	204	23	.43	.45	.61	.94	1.28	1.37	1.54	2.11	2.25	1.45	.43	.47	13.33
	Plainview	----	----	----	----	----	23	do	Oct. 29	200	27	.40	.55	.63	.99	1.55	1.82	1.83	2.27	2.42	1.45	.51	.65	15.07
	Tatum	16	35.7	77.1	108	—32	12	Apr. 17	Oct. 26	194	20	.36	.51	.67	.75	1.79	1.88	2.35	2.73	2.42	1.19	.49	.54	15.68

C. Conia.
3.

LATITUDE: 32° 42' N
LONGITUDE: 103° 08' W
ELEV. (GROUND): 3615 Ft.

CLIMATOLOGICAL SUMMARY

STATION: HOBBS
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1921 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes								Snow, Sleet						Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
Jan.	56.4	27.0	41.7	83	1953	- 3	1948+	720	0.46	1.01	1944	1.4	7.7	1948	4.5	1944	1	0	1	23	*	Jan.
Feb.	61.0	30.8	45.9	87	1940+	- 1	1951	530	0.38	0.87	1921	0.5	3.0	1924+	3.0	1924	1	0	1	17	*	Feb.
Mar.	67.5	35.8	51.6	93	1946	1	1922	420	0.40	0.95	1941	1.0	10.0	1958	6.5	1941	1	*	*	11	0	Mar.
Apr.	76.5	45.1	60.8	98	1928¢	17	1939	170	0.89	1.87	1926	0.3	8.0	1942	8.0	1942	2	2	0	2	0	Apr.
May	84.3	54.1	69.2	107	1951	34	1938	10	1.97	4.10	1947	0	0	—	0	—	3	9	0	0	0	May
June	92.7	63.2	77.9	110	1960+	37	1939	0	1.67	4.04	1921	0	0	--	0	--	3	22	0	0	0	June
July	93.0	65.6	79.4	110	1958	47	1939	0	2.09	3.53	1960	0	0	—	0	—	3	24	0	0	0	July
Aug.	92.8	65.7	79.1	107	1952	45	1939	0	1.73	2.80	1932¢	0	0	—	0	—	3	24	0	0	0	Aug.
Sept.	86.9	58.8	72.9	109	1939	34	1948	0	2.26	4.62	1950	0	0	--	0	--	3	12	0	0	0	Sept.
Oct.	76.6	48.2	62.5	98	1947	23	1925	140	1.83	2.62	1960	T	T	1958	T	1958	3	2	0	*	0	Oct.
Nov.	65.4	35.1	50.3	88	1952	9	1957+	440	0.37	0.78	1940	0.2	4.0	1944	2.0	1944	1	0	*	11	0	Nov.
Dec.	57.9	29.0	43.3	84	1922	1	1926+	670	0.53	1.86	1942	1.4	8.0	1960	5.0	1960+	1	0	1	21	0	Dec.
Year	75.9	46.5	61.2	110	June 1960+	- 3	Jan. 1948+	3100	14.68	4.62	Sept. 1950	4.8	10.0	Mar. 1958	8.0	Apr. 1942	25	85	3	85	*	Year

ATITUDE: 34° 10' N
ONGITUDE: 103° 21' W
LEV. (GROUND): 4010 Ft.

CLIMATOLOGICAL SUMMARY

STATION: PORTALES
NEW MEXICO

MEANS AND EXTREMES FOR PERIOD OF RECORD: 1931 - 1960

	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					
	Means			Extremes								Snow, Sleet						Temperatures				
																		Max.		Min.		
Month	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	Month
(a)	30	30	30	30	--	30	--	30	30	30	--	30	30	--	30	--	30	30	30	30	30	(a)
an.	52.6	21.4	37.3	80	1950	-18	1947	860	0.46	1.08	1939	2.5	11.0	1936	5.0	1947+	1	0	.2	28	1	Jan.
Feb.	58.0	25.3	41.8	83	1950	-28	1933	650	0.36	0.78	1948	1.1	4.2	1938	4.0	1960	1	0	1	22	*	Feb.
Mar.	65.4	30.7	48.2	92	1946	5	1947+	520	0.54	1.15	1933	0.9	6.0	1934+	6.0	1934	1	*	*	18	0	Mar.
Apr.	74.6	39.9	57.2	98	1937	11	1945	250	0.77	1.50	1940+	0.4	3.0	1940	3.0	1940	2	1	0	5	0	Apr.
May	81.9	50.3	66.1	102	1938	29	1954+	60	2.42	3.30	1957	0	0	--	0	--	4	5	0	*	0	May
une	91.0	59.0	75.2	106	1957	37	1955	0	2.41	4.00	1941	0	0	--	0	--	4	18	0	0	0	June
uly	92.6	62.7	77.6	107	1940	51	1952+	0	2.93	4.36	1948	0	0	--	0	—	4	23	0	0	0	July
Aug.	91.5	61.5	76.5	105	1944	47	1944	0	2.66	5.15	1952	0	0	--	0	—	4	21	0	0	0	Aug.
Sept.	84.8	54.3	69.5	104	1945	31	1945	30	1.91	2.10	1941	0	0	--	0	--	3	8	0	*	0	Sept.
Oct.	74.9	42.6	58.9	93	1959+	22	1949	220	1.50	2.47	1960	0.2	4.0	1936	4.0	1936	3	*	0	3	0	Oct.
Nov.	62.7	28.8	45.7	90	1950	4	1952+	580	0.45	0.92	1934	0.7	6.0	1931	5.0	1931	1	0	*	20	0	Nov.
Dec.	54.9	23.4	39.1	78	1958	- 9	1939	800	0.58	1.45	1943	2.5	11.5	1931	6.0	1960	2	0	1	28	*	Dec.
Year	73.7	41.7	57.7	107	July 1940	-28	Feb. 1933	3970	16.99	5.15	Aug. 1952	8.3	11.5	Dec. 1931	6.0	Dec. 1960+	30	77	4	124	1	Year

* Less than one half.
** Base 65° F (estimated).
(a) Average length of record, years.

T Trace, an amount too small to measure.
+ Also on earlier dates, months, or years.
¢ Partial year's record considered.

CLIMATE OF PORTALES, NEW MEXICO

3. Continued

The frost-free season ranges from 190 to 210 days between early April and early November. Nearly 85 percent of the average annual 13.5 to 18.5 inches of precipitation falls during this frost-free period. Most rainfall occurs as brief and frequently heavy thundershowers occasionally accompanied by hail and favors the growth of native, perennial, warm-season vegetation. A minor amount of precipitation falls as snow in the winter and usually melts within a few hours. Practically all moisture received in this area originates in the Gulf of Mexico. Occasionally an upslope movement of moist air from the Gulf results in steady, prolonged rains but these are rare and usually occur in the spring or fall benefitting the minority population of cool-season plants.

4. Strong winds from the south and southwest prevail from February through May. This accelerates drying of the surface soil during a time when it is normally low in moisture and also when relative humidity is the lowest. The wind blows from the south more often than from any other direction. The average hourly wind velocity is about 12 miles per hour throughout the year. In the northern end of HP-3, occasional upslope movements of air in the winter may produce low cloudiness, rain and icing for several hours at a time.

D. SOILS

1. These are well drained, very shallow soils over petrocalcic layers and hard, platy caliche layers. The surface textures are gravelly loam, fine sandy loam, and gravelly fine sandy loam. The textures of the subsurface layers are fine sandy loam, loam, gravelly loam, and gravelly fine sandy loam. The caliche and petrocalcic layers are normally at depths less than 10 inches. Permeability is moderate above the petrocalcic and caliche layers. The available water capacity is moderate to high. The effective rooting depth is 10 inches or less. The plant-soil-air-water relationship is good. The very shallow petrocalcic and caliche layers hold water up available to shallow rooted, rhizomatous and stoloniferous short and mid-grasses for short periods of time, followed by rapid drying of the soil. If unprotected by plant cover and organic residues these soils become wind blown and easily eroded.

2. SOIL TAXONOMIC UNITS INCLUDED IN THIS SITE

Representative Soils are:

Kimbrough gravelly loam
Kimbrough fine sandy loam
Potter fine sandy loam
Potter gravelly fine sandy loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential natural plant community of this site has the aspect of a short grass plains grassland. It is composed largely of short and mid grasses such as the gramas, and buffalograss with lesser amounts of perennial forbs and a few scattered shrubs and half-shrubs. Response to dynamic climatic flux is exhibited by the annual grass and annual forb components which fluctuate somewhat from year to year with annual and seasonal variation in amount and distribution of rainfall.

2. Composition of potential plant community
Expressed as approximate percentage of total, annual, air-dry vegetative production.

Grasses and Grass-like plants	70-85%	Woody-shrubs, half-shrubs, vines and trees	5-10%	Forbs	10-15%
Sideoats grama	25	Mormon-tea Small soapweed Winterfat	3-5	Croton Senna Globemallow	5-7
Black grama	20				
Blue grama [illegible]ry Grama	15	Feather dalea Wright eriogonum	1-2	Fleabane Hoffmanseggia Indian blanket Plains blackfoot Paperflower Cutleaf Haplopappus Wooly groundsel	3-5
Buffalograss	3-5	Engelmann prickly-pear Plains prickly-pear Broom snakeweed	1-3		
Sand dropseed Wolftail	3-5				
Threeawns	1-3			Other annual forbs	1-3
Little bluestem Arizona cottontop	1-2				
New Mexico feather-grass Bottlebrush squirreltail	1-2				
Ring muhly Fluffgrass	1-2				
Other annual grasses	1-5				

E. 3. Ground Cover

	Percent of Surface Area
Grasses and forbs - plant density	20%
Shrubs and half-shrubs - canopy	5%
Bare ground	20%
Surface gravel	10%
Surface cobble and stones	15%
Litter - percent of area	30%
average depth in cm.	< 2 cm.

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air Dry)

Favorable Years	800 lbs/acre
Median Years	650 lbs/acre
Unfavorable Years	350 lbs/acre

G. SITE INTERPRETATIONS

1. Grazing

This site provides forage suitable for grazing during all seasons of the year, although the site in itself lacks cover and protection for livestock from winter storms. It is suitable for grazing by all classes of cattle and also by sheep where protection from, and control of predators can be provided. This site, when in high condition, is not well suited for goats due to the lack of woody browse which is highly preferred and constitutes a large portion of the goat diet. In general, cattle grazing will result in a decrease in palatable mid-grasses and forbs, with a corresponding increase in low value grasses, unpalatable and poisonous forbs and woody plants. Sheep grazing results in a decrease in palatable forbs, short grasses and mid-grasses with an increase in low value grasses and woody plants. Grazing by goats will result in a decrease of woody vegetation and an increase in grasses. Continuous, year long livestock grazing or grazing continually during the potential growing season will result in a decrease in the vigor and abundance of sideoats grama, black grama, little bluestem, Arizona cottontop, winterfat and Morman-tea, with an increase in cactus, threeawns, other low-value grasses and brush. Eventually wooly groundsel will increase and mesquite, catclaw and cholla cactus will invade. Well planned systems of deferred grazing by domestic livestock which vary the seasons of grazing and rest in pastures during successive years, will result in a balanced plant community providing high quality forage and browse during all seasons of the year.

2. Wood Products

The natural potential plant community of this site affords little or no wood products of value.

3. Habitat for Wildlife

(To be completed by biologist)

4. Hydrological Interpretations

The hydrologic groups for soils in this site are as follows:

Soil Series	Hydrologic Group
Kimbrough	D
Potter	C

The hydrologic curve number when vegetation is in its potential condition is 81 for soils in the C group and 88 for the D soils.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, quail and dove hunting, antelope hunting, and predator hunting. During years of abundant spring moisture this site displays a few showy wildflowers from May through July.

6. Endangered Plants and Animals

There are presently no known endangered plant species which are a part of the potential plant community of this site. As these become known, they will be added to this section.

(Animal portion to be completed by biologist)

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rates

Condition Class	% Potential Vegetation	Acres per Animal Unit Month
Excellent	100 - 76	3.3 - 4.0
Good	75 - 51	3.8 - 5.1
Fair	50 - 26	5.3 - 8.3
Poor	25 - 0	9.0 +

H. 2. Relative Quality of Plants for Animal Use[1]

(a) Cattle

Primary

Sideoats grama
Little bluestem
Black grama
Arizona cottontop
New Mexico feathergrass
Blue grama
Globemallow
Plains blackfoot
Mormon-tea
Winterfat

Secondary

Bottlebrush squirreltail
Other annual grasses
Wolftail
Sand dropseed
Buffalograss
Hairy grama
Senna
Fleabane
Hoffmanseggia
Indian blanket
Other annual forbs
Small soapweed
Wright eriogonum

Low Value

Ring muhly
Fluffgrass
Threeawns
Croton
Paperflower
Cutleaf Haplopappus
Wooly groundsel
Feather dalea
Engelmann pricklypear
Plains pricklypear
Broom snakeweed

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[1] See Attachment #1, "Legends and Definitions for Range Site Descriptions"

H. 2. Continued

(b) Sheep

Primary	Secondary	Low Value
Senna	Croton	Wooly groundsel
Globemallow	Hoffmanseggia	Threeawns
Fleabane	Plains blackfoot	Ring muhly
Indian blanket	Paperflower	Fluffgrass
Other annual forbs	Cutleaf Haplopappus	Small soapweed
Sideoats grama	Sand dropseed	Engelmann pricklypear
Black grama	Little bluestem	Plains pricklypear
Blue grama	Arizona cottontop	Broom snakeweed
Hairy grama	New Mexico feathergrass	
Buffalograss	Bottlebrush squirreltail	
Wolftail	Other annual grasses	
Mormon-tea	Feather dalea	
Winterfat		
Wright eriogonum		

(c) Antelope

Globemallow	Senna	Hairy grama
Croton	Wooly groundsel	Threeawns
Fleabane	Other annual forbs	Ring muhly
Hoffmanseggia	Sideoats grama	Fluffgrass
Indian blanket	Black grama	Small soapweed
Plains blackfoot	Blue grama	Wright eriogonum
Paperflower	Buffalograss	Engelmann pricklypear
Cutleaf Haplopappus	Sand dropseed	Plains pricklypear
Broom snakeweed	Wolftail	
New Mexico feathergrass	Little bluestem	
Bottlebrush squirreltail	Arizona cottontop	
Mormon-tea	Other annual grasses	
Winterfat		
Feather dalea		

H. 2. Continued

(d) Dove and Quail

Primary

Croton
Senna
Globemallow
Plains blackfoot
Wright eriogonum
Broom snakeweed

Secondary

Hoffmanseggia
Indian blanket
Cutleaf Haplopappus
Other annual forbs
Buffalograss
Sand dropseed
Arizona cottontop
Fluffgrass
Mormon-tea
Winterfat
Feather dalea
Engelmann pricklypear
Plains pricklypear

Low Value

Fleabane
Paperflower
Wooly groundsel
Sideoats grama
Black grama
Blue grama
Hairy grama
Wolftail
Threeawns
Little bluestem
New Mexico feathergrass
Bottlebrush squirreltail
Ring muhly
Other annual grasses
Small soapweed

I. IDENTIFICATION AND AUTHORIZATION

1. U.S.D.A. Soil Conservation Service
   New Mexico State Office, Albuquerque, New Mexico
   High Plains, MLRA77

2. Field Offices where site occurs

New Mexico	Texas
Lovington Portales Clovis Tucumcari	

3. Best Example Location in Sub-Resource Area

   Lea County, New Mexico - extreme NE corner of NE¼ Section 12, T-16S, R-37E, NMPM. 9 miles east of Lovington, New Mexico, on south side of Highway #83. Lea County, N.M. Soil Survey Map Sheet #40, Kg mapping unit, Kimbrough gravelly loam.

4. Site Approval:

State Range Conservationist — Date

Regional Range Conservationist — Date

Attachment #1

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing.

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plants listed.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-17-NTx Bottomland Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

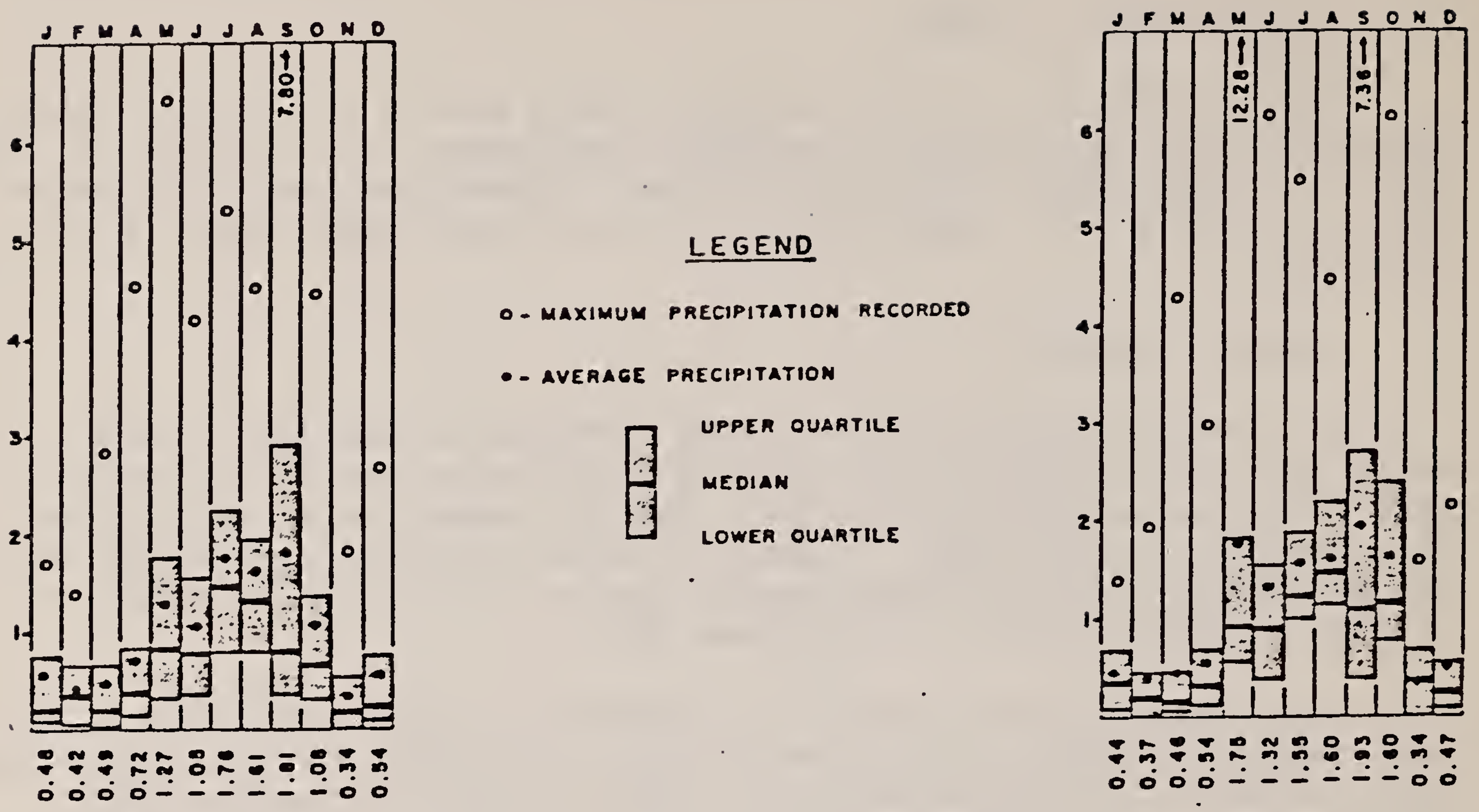
This site occurs on broad valleys, flood plains or basins at the lowest position in relation to adjacent landscapes. It is found at the mouth of intermittent drainages or draws. Slopes are level to nearly level, averaging less than 3 percent. Elevations range from 2,500 to 3,900 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



ROSWELL

CARLSBAD

RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils of this site are deep and well drained to moderately well drained. The surface textures are loamy fine sand, very fine sandy loam, fine sandy loam, sandy loam, silt loam and silty clay loam. The underlying layers may be loamy fine sand to silty clay loam. The soils have rapid to moderately slow permeability. Available water-holding capacity is moderate to high. The plant-soil-air-water relationship is good. the coarse-textured surface soils become seriously wind blown if unprotected by vegetation and organic residue.

2. Some soil taxonomic units are:
Glendale fine sandy loam (as mapped in Chaves County, NM)
Glendale loam (as mapped in Chaves County, NM)
Bippus silty clay loam (as mapped in Eddy County, NM)
Bigetty silty clay loam (as mapped in Eddy County, NM)
Vinton soils
Largo silt loam overflow, 0 to 1 percent slopes
  (as mapped in Eddy County)
Harkey very fine sandy loam, 0 to 1 percent slopes
  (as mapped in Eddy County)
Harkey sandy loam

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential plant community exhibits a tall-grass aspect composed largely of giant sacaton. Mesquite and fourwing saltbush are sparse and widely scattered. Minor amounts of annual and perennial forbs are also present but less noticeable.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 80-90%		(Shrubs, half shrubs, vines and trees) Woody - 5-10%		Forbs - 5-10%	
Giant sacaton	65-70	Fourwing saltbush	3-5	Peppergrass mustard)	
Tobosa)	7-10	Mesquite)	1-3	Globemallow)	3-5
Alkali sacaton)		Littleleaf sumac)		Coyote melon)	
Vine-mesquite)	3-5	Apacheplume)	1-2	Annual sunflower)	2-5
Plains bristlegrass)		American tarbush)		Other annual forbs)	
White tridens)					
Cane bluestem)	3-5				
Twoflower trichloris)					

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	36
Trees and shrubs - canopy	3
Bare ground	18
Surface gravel	0
Surface cobble and stones	0
Litter - percent of area	43
average depth in cm.	5

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years - 4,800 pounds per acre
Median years - 4,000 pounds per acre
Unfavorable years - 2,500 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is best suited and most efficiently utilized by mother cows during the summer growing season from June through September. Periodic removal of excess coarse stalk material by burning, shredding or mowing every other year will help to keep new growth available to livestock. Burning, if practiced, should be done in late winter or early spring when soil surface moisture is present. Resting alternate years will help to maintain plant vigor.

2. Wood Products

The roots and lower trunks of mesquite provide attractive material for a variety of curiosities and small furniture.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by black-tailed jackrabbit, yellow-faced pocket gopher, coyote, meadowlark, mourning dove, scaled quail, sparrow hawk, Western spadefoot toad and Western diamondback rattlesnake.

Where this site includes riparian vegetation along the Pecos and Black rivers, the resident animal community is characterized by raccoon, gray fox, muskrat, red-winged blackbird, summer tanager, ferruginous hawk, mourning dove, Gambel's quail, killdeer, tree lizard, Eastern fence lizard, tiger salamander, leopard frog, bullfrog and checkered garter snake.

Most resident birds and Bullock's oriole, blue grosbeak, painted bunting, Swainson's hawk and mourning dove nest. Where aquatic macrophytes occur, yellow-throated warbler nest. Sandhill crane and long-billed curlew winter along the Pecos River and American avocet and black-necked stilt utilize this site during migration. The golden eagle utilizes large trees for roosting and, occasionally, nesting.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Bippus	B
Bigetty	C
Glendale	B
Harkey	B
Largo	B
Vinton	B

Approximate hydrologic curve number when the hydrologic cover is optimum: B Soils - 63; C Soils - 75.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, nature observation and photography, antelope hunting, and quail and dove hunting.

Natural beauty is enhanced by the contrast between this lush vegetated site and the drier, more barren sites which surround it.

6. Endangered Plants and Animals

Species names to be included as reliable information becomes available.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	1.5-2.3
Good (75-51)	2.4-3.3
Fair (50-26)	3.4-6.0
Poor (25-0)	6.1 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Giant sacaton	Tobosa	American tarbush
Alkali sacaton	Mesquite	
Vine-mesquite	Littleleaf sumac	
Plains bristlegrass	Apacheplume	
White tridens	Peppergrass mustard	
Cane bluestem	Globemallow	
Twoflower trichloris	Coyote melon	
Fourwing saltbush	Other annual forbs	
Annual sunflower		

(b) Quail and Dove

Primary	Secondary	Low Value
Annual sunflower	Peppergrass mustard	Apacheplume
Littleleaf sumac	Other annual forbs	American tarbush
Fourwing saltbush	Giant sacaton	Alkali sacaton
Mesquite	Vine-mesquite	Tobosa
Plains bristlegrass	White tridens	Cane bluestem

(c) Antelope

Primary	Secondary	Low Value
Peppergrass mustard	Giant sacaton	Alkali sacaton
Globemallow	Tobosa	Cane bluestem
Coyote melon	White tridens	Mesquite
Annual sunflower	Littleleaf sumac	American tarbush
Vine-mesquite	Apacheplume	
Plains bristlegrass		
Fourwing saltbush		

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:

New Mexico	Texas
Roswell	Dell City
Portales	
Lovington	
Carlsbad	
Artesia	
Alamogrodo	

3. Field Office Sample Location:
   Eddy County, New Mexico - N. W. 1/4, S. E. 1/4, Section 28, T. 26 S., R. 24 E., NMPM Approximately 1.9 miles northeast of Texas-New Mexico state line on south side of Highway 180. Hk mapping unit, Harkey very fine sandy loam, on map sheep #148, Eddy Area, New Mexico, soil survey publication.

4. Approved:

D. Sylvester 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

> Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.
>
> Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.
>
> Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-5-NTx Deep Sand Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

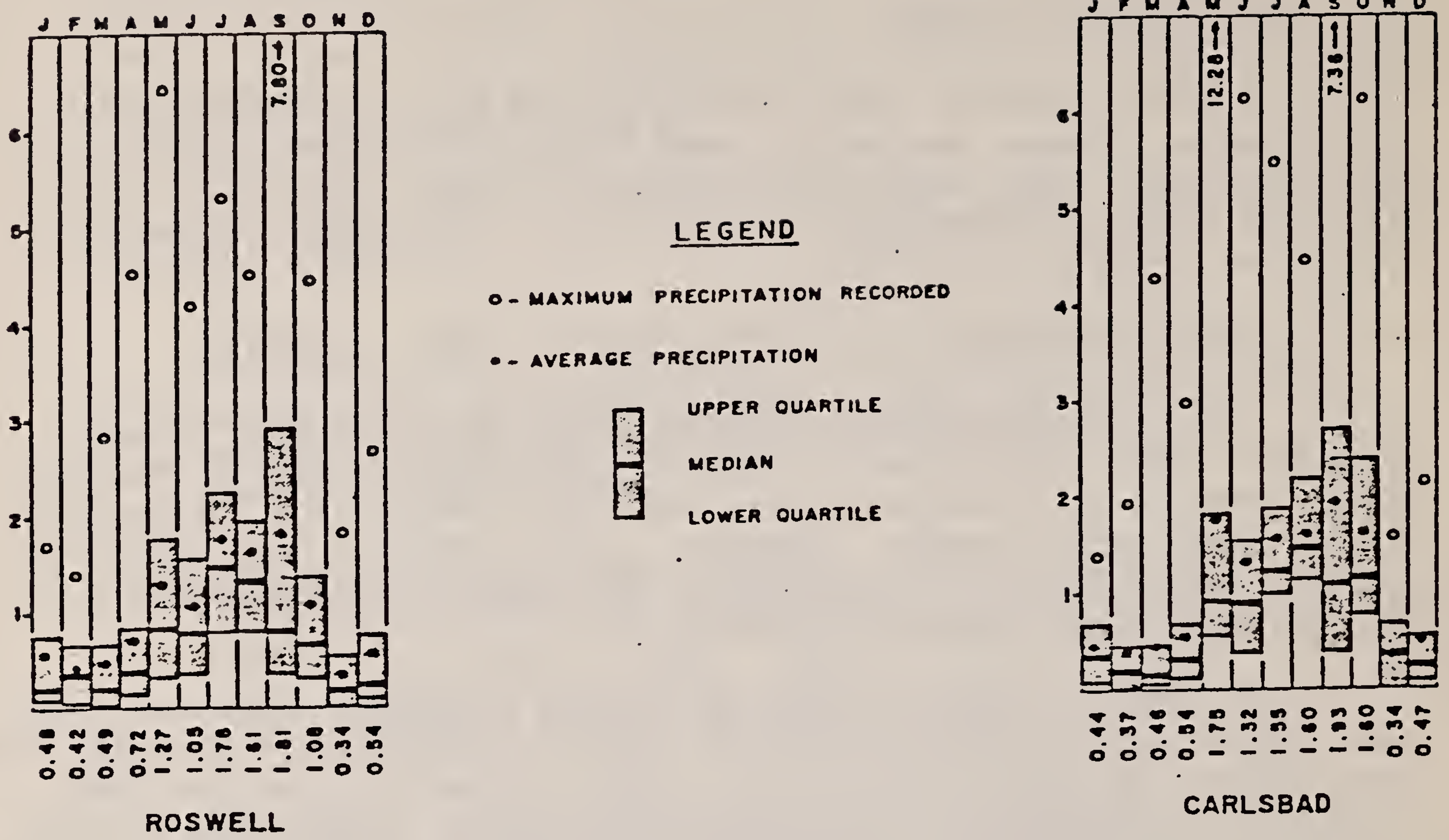
This site occurs on upland plains or old basins between desert drainageways. Slopes are nearly level to gently sloping, usually less than 5 percent. Low, stabilized hummocks or dunes frequently occur. Direction of slope varies and is usually not significant. Elevations range from 2,500 to 4,100 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



ROSWELL

CARLSBAD

RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils of this site are deep and well drained. The surface layer textures are fine sand and loamy fine sand greater than 40 inches deep. The underlying layers may be loamy fine sand or fine sandy loam. The soils have rapid permeability. Available water-holding capacity is moderate. The plant-soil-air-water relationship is fair to good. Because of the coarse textures and rapid drying of the surface, the soil, if unprotected by plant cover and organic residue, becomes windblown and low hummocks or dunes are formed around shrubs.

2. Some soil taxonomic units are:
Kermit fine sand 8 percent slopes
Kermo fine sand 8 percent slopes
Pintura fine sand
Bluepoint fine sand
Penwell fine sand
Tonuco loamy fine sand hummocky
Likes fine sand (as mapped in Lea County, New Mexico)
Roswell fine sand

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential plant community of this site has a grassland aspect. It is dominated by tall- and mid-grasses with shrubs and half shrubs scattered and evenly dispersed. A variety of perennial and annual forbs occur and fluctuate considerably from year to year with annual and seasonal variation in amount and distribution of rainfall. The perennial grass and shrub population fluctuates less drastically.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 60-70%	
*Giant dropseed	35-45
*Mesa dropseed	
Spike dropseed	
Sand dropseed	
*Sand bluestem	3-5
*Little bluestem	3-5
Flatsedge	1-3
*Threeawns spp.	3-7
Sand paspalum	1-3
Black grama	1-3
Almejita signalgrass	1-3
Field sandbur	1-3
*Other annual grasses	1-5
Havard panicum	1-3

(Shrubs, half shrubs, vines and trees) Woody - 15-20%	
*Shinnery oak	5-10
*Sand sagebrush	1-3
*Small soapweed	5-10
Fourwing saltbush	1-3
Plains rabbitbrush	1-3
Other shrubs	1-3

Forbs - 10-20%	
*Leatherweed croton	3-7
Wooly gaura	
Scarlet gaura	
Blanket flower	
Wooly dalea	
Phlox heliotrophe	3-7
*Halfshrub sundrop	
*Penstemon	
Aster	
Palefoxia	
Scorpionweed	1-5
Deerstongue	
Fleabane	
Nama	
Hoffmanseggia	
Lemon beebalm	3-7
Spectacle pod mustard	
Hymenopappus	
Stickleaf	
Annual sunflower	
Annual wild buckwheat	
Threadleaf groundsel	1-3
*Other annual forbs	1-5

* See Form SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	16
Trees and shrubs - canopy	10
Bare ground	38
Surface gravel	0
Surface cobble and stones	0
Litter - percent of area	36
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years - 1,600 pounds per acre
Median years - 1,300 pounds per acre
Unfavorable years - 600 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. Where shinnery oak has increased considerably above the amount in the potential plant community it becomes toxic and can result in cattle losses if grazed in the late bud and early leaf stage. This site is best suited and most efficiently utilized by cattle. It could be utilized by minor proportions of goats in combination with cattle if protection from, or control of predators can be provided.

2. Wood Products

The natural potential plant community of this site affords little or no wood products. Where the site has been invaded by mesquite the roots and stems of these plants provide attractive material for a variety of curiosities and small furniture.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, spotted ground squirrel, Ord's kangaroo rat, Northern grasshopper mouse, Southern plains woodrat, badger, meadowlark, roadrunner, white-necked raven, pyrrhuloxia, cactus wren, lesser prairie chicken, mourning dove, scaled quail, Harris' hawk, side-blotched lizard, marbled whiptail, Texas horned lizard, Western diamondback rattlesnake and ornate box turtle.

Where mesquite has invaded, most resident birds and scissor-tailed flycatcher, mourning dove and Swainson's hawk nest. Where sand hummocks form with shrubs, rodent populations and their predators increase. Vesper and grasshopper sparrows utilize the site during migration. Where dunes are associated with the site, ferruginous hawks occasionally nest and white-tailed deer are found (Mescalero Sands). Fourwing saltbush, shinnery oak, sand sagebrush and mesquite provide protective cover for scaled quail. Seed, green herbage and fruit from a variety of grasses, forbs and shrubs provide food for a number of birds and mammals, including mourning dove, scaled quail, and antelope.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Kermit	A
Kermo	A
Pintura	A
Bluepoint	A
Penwell	A
Tonuco	C
Likes	A
Roswell	A

Approximate hydrologic curve number when the hydrologic cover is optimum: A Soils - 39; C Soils - 81.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, relict hunting, and quail, dove, antelope and predator hunting.

During years of abundant spring moisture, this site displays a colorful array of wildflowers during May and June. A few summer and fall flowers also occur.

6. Endangered Plants and Animals

Presently there are no known and endangered plants which are a part of the potential vegetation or endangered animals which are indigenous to this site. As these become known they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	2.5-3.8
Good (75-51)	3.5-6.0
Fair (50-26)	6.1-11.0
Poor (25-0)	11.1 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Giant dropseed	Mesa dropseed	Threeawns spp.
Sand bluestem	Spike dropseed	Field sandbur
Little bluestem	Sand dropseed	Other shrubs
Flatsedge	Almejita signalgrass	Leatherweed croton
Sand paspalum	Shinnery oak	Deerstongue
Black grama	Small soapweed	Nama
Havard panicum	Wooly gaura	Hoffmanseggia
Fourwing saltbush	Annual sunflower	Threadleaf groundsel
Halfshrub sundrop	Stickleaf	Other shrubs
Penstemon	Phlox heliotrophe	Other annual forbs

(b) Antelope

Primary	Secondary	Low Value
Little bluestem	Giant dropseed	Flatsedge
Leatherweed croton	Mesa dropseed	Field sandbur
Blanket flower	Sand dropseed	Threeawns spp.
Halfshrub sundrop	Spike dropseed	Other shrubs
Aster	Sand bluestem	
Spectaclepod mustard	Black grama	
Stickleaf	Wooly gaura	
Annual sunflower	Scarlet gaura	
Annual wild buckwheat	Deerstongue	
Fourwing saltbush	Fleabane	
	Horsemint	
	Hymenopappus	
	Other annual forbs	

(c) Quail and Dove

Primary	Secondary	Low Value
Annual sunflower	Giant dropseed	Black grama
Stickleaf	Spike dropseed	Little bluestem
Leatherweed croton	Mesa dropseed	Sand bluestem
Hoffmanseggia	Sand dropseed	Field sandbur
Wooly gaura	Almejita signalgrass	Other annual grasses
Scarlet gaura	Annual wild buckwheat	Sand sagebrush
Havard panicum	Shinnery oak	Other shrubs
Sand paspalum	Fourwing saltbush	Lemon beebalm
Phlox heliotrophe	Other annual forbs	

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:
   Roswell
   Portales
   Artesia
   Carlsbad
   Lovington
   Alamogordo

3. Field Office Sample Location:
   Lea County, New Mexico - S. W. 1/4, N. E. Section 24, T. 26 S., R. 36 E., NMPM Frank Anthony Ranch. Lea Soil Survey Map Sheet #168, KM Mapping Unit - Kermit portion of Kermit Soils and duneland.

4. Approved:

D. Sylvester 1/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-8-NTx Draw Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

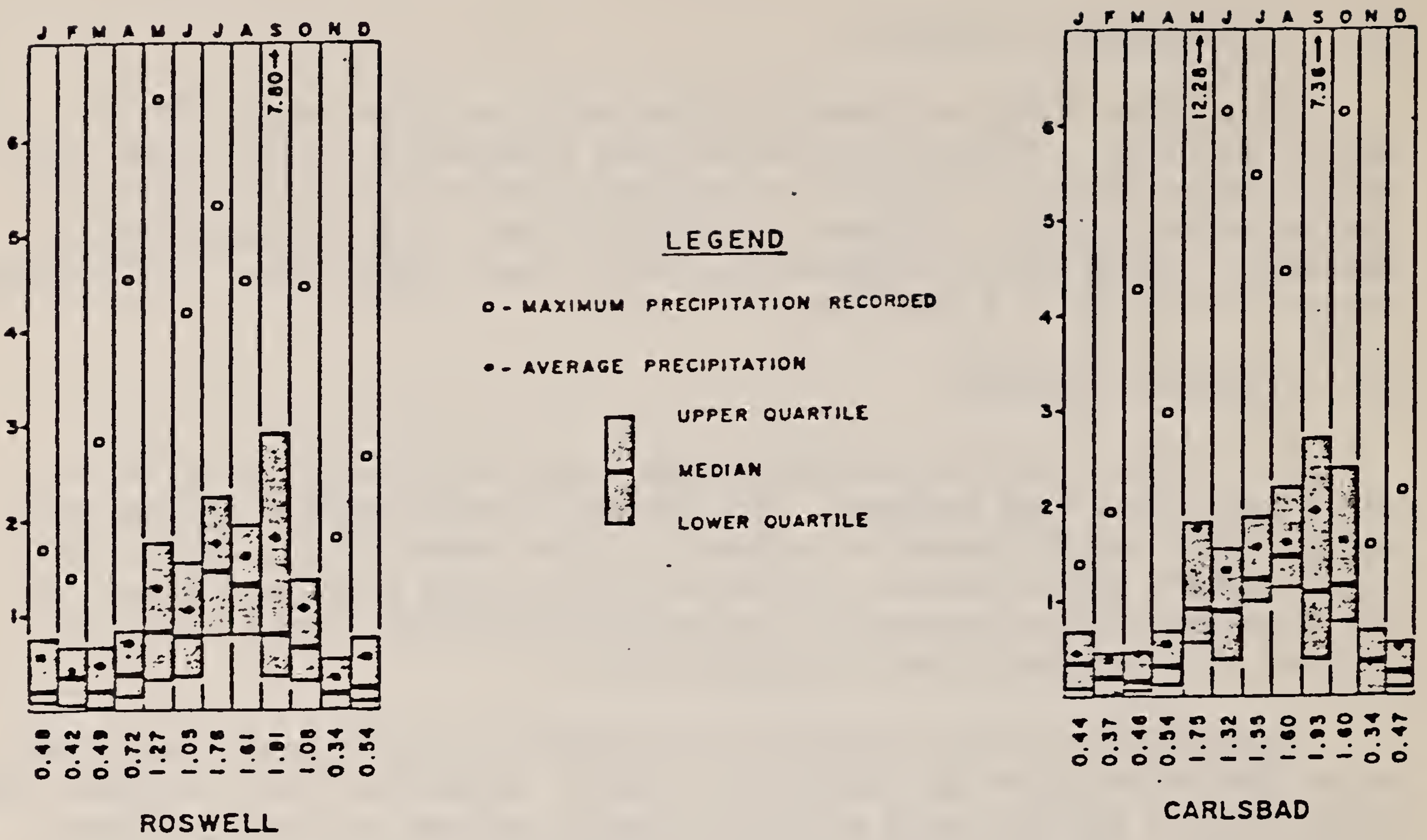
This site occurs as desert drainageways or draws which disect plains or hills. This site receives and transports runoff water from both remote higher elevations and adjacent sites to closed basins or larger water courses. Slopes are nearly level, usually less than 3 percent. Direction of slope varies and is not significant. Elevations range from 2,500 to 4,000 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



ROSWELL

CARLSBAD

RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils are deep, well drained and occasionally flooded. They include mixed alluvial land, and the following textures may be cobbly where they occur adjacent to, or below, limestone controlled landscapes. The surface layers are loams, silt loams, clay loams, and some very fine sandy loams. The underlying layers are stratified silt loams, clay loams, silty clay loams, and some loams and sandy loams. The soils have moderate to slow permeability. Water-holding capacity is moderate to high. The plant-soil-air-water relationship is fair to good. If unprotected by vegetation and residue, the soils become water eroded. Runoff is then channelized into gullies, greatly narrowing the area of beneficial overflow.

2. Some soil taxonomic units are:
   Alama loam (flooded periodically)
   Gageby silt loam
   Hodgins silty clay loam, depressed
   Pecos silty clay loam, non-saline
   Pima clay loam
   Reyab silt loam
   Reyab very fine sandy loam
   Rockhouse loam
   Toyah loam
   Toyah clay loam
   Vinton soils
   Mixed alluvial land (as mapped in Lea County, NM)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. This site has the appearance of an elongated concave savannah with trees and shrubs being dominant in stature. However, tall bunch-grasses, mid-grasses, rhizomatous and stoloniferous short-grasses are the greatest annual production component. There is also an abundant variety of forbs in the understory. Vegetation on the site varies dynamically with the parent material and origin of the mixed alluvial soils and also with soil depth and the amount of stone and cobble in the profile.

Under natural conditions, this site as in continual cyclic flux from tree and shrub dominance to destruction by wildfire and a successional stage of grasses, then back to shrubs and trees in a savannah. With the event of civilized man and suppression of fire, the vegetation has become increasingly occupied by shrubs. Soils disturbance by a variety of rodents is a natural characteristic of the site and contributes to the prolific forb population.

2. Composition of Potential Plant Community

Approximate percentage of total annual production.

Grasses and Grasslike - 50-65%		(Shrubs, half shrubs vines and trees) Woody - 10-20%		Forbs - 15-25%	
*Cane bluestem)		*Fourwing saltbush)		Globemallow)	
Arizona cottontop)	15-20	Tornillo)		Verbena)	
*White tridens)		*Mesquite	)5-10	Indian blanket)	3-5
Twoflower trichloris)		Catclaw mimosa)		Halfshrub sundrop)	
*Giant sacaton)		Viscid acacia)		Scorpionweed)	
Alkali sacaton)	10-15	Knifeleaf condalia)		Desert holly)	
*Tobosa)		*Brickellbush)	3-5	Sensitive briar)	3-5
*Vine-mesquite)		Tarbush)		Mexican sagewort)	
*Sideoats grama)	5-10	*Littleleaf sumac)		Fleabane)	
*Plains bristlegrass)		Desertwillow	)3-5	Tansyleaf aster)	1-3
Blue grama)		New Mexico Walnut)		Wild Rabbit tob-)	
Silver bluestem)		Virginsbower)		acco)	
Hooded windmillgrass)	5-10			Peppergrass mustard)	
Slim tridens)				Wooly Indian-wheat)	
Black grama)	3-5			Annual sunflower)	
Bush muhly)				Texas filaree	)5-10
*Burrograss)				Arizona filaree)	
Mat muhly)	3-5			Jimsonweed)	
Buffalograss)				Buffalobur)	
Other annual grasses	3-5			*Other annual forbs	)1-3

* See Forms SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	23
Trees and shrubs - canopy	12
Bare ground	6
Surface gravel	2
Surface cobble and stones	8
Litter - percent of area	49
average depth in cm.	4

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years - 2,600 pounds per acre
Median years - 2,100 pounds per acre
Unfavorable years - 1,200 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It can be most efficiently utilized by combinations of cattle, sheep, and goats. If sheep and goats are grazed, protection from, or control of predators should be provided.

2. Wood Products

This site has a fairly abundant supply of driftwood which is used in decorations and dried flower arrangements. Wood from the roots, trunks, and stems of walnut and mesquite provide attractive material for a variety of curiosities and small furniture.

3. Habitat for Wildlife

This range site provides habitats which suppoort a resident animal community that is characterized by desert cottontail, spotted ground squirrel, yellow-faced gopher, Southern Plains woodrat, gray fox, bobcat, roadrunner, ladder-backed woodpecker, loggerhead shrike, mockingbird, crissal thrasher, pyrrhuloxia, ferruginous hawk, mourning dove, Gambel's quail, tree lizard, Eastern fence lizard, Western spadefoot toad and Western diamondback rattlesnake.

Where the site includes riparian vegetation, summer tanager occurs and Swainson's hawk nest. Where associated with Limestone Hills, mule deer utilize the site. Most resident birds and scissor-tailed flycatcher, ferruginous hawk, Western kingbird, lark sparrow and mourning dove nest. The golden eagle utilizes large trees for roosting and, occasionally, nesting.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Alama	C
Gageby	B
Hodgins	B
Pecos	D
Pima	B
Reyab	B
Rockhouse	
Toyah	B
Vinton	B

Approximate hydrologic curve number when the hydrologic cover is optimum: B Soils - 65; C Soils - 77; D Soils - 85.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, picnicking, camping, outdoor classrooms, nature observation and photography, relict hunting, and quail, dove, antelope, and mule deer hunting.

Colorful wildflowers are abundant from spring through fall. The lush vegetative growth resulting from extra water received by this site makes it seem as an "oasis" in contrast with the bareness of most adjacent desert sites.

6. Endangered Plants and Animals

Presently there are no known endangered plants which are a part of the potential vegetation or endangered animals which are indigenous to this site. As these become known they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	2.8-3.7
Good (75-51)	3.5-5.0
Fair (50-26)	5.0-6.8
Poor (25-0)	6.9 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary

- Arizona cottontop
- Cane bluestem
- White tridens
- Twoflower trichloris
- Giant sacaton
- Alkali sacaton
- Tobosa
- Vine-mesquite
- Sideoats grama
- Plains bristlegrass
- Blue grama
- Silver bluestem
- Black grama
- Bush muhly
- Buffalograss
- Annual sunflower
- Verbena
- Texas filaree
- Arizona filaree
- Fourwing saltbush

Secondary

- Hooded windmillgrass
- Slim tridens
- Burrograss
- Mat muhly
- Other annual grasses
- Globemallow
- Indian blanket
- Halfshrub sundrop
- Sensitive briar
- Tansyleaf aster
- Peppergrass mustard
- Wooly Indian-wheat
- Other annual forbs
- Mesquite
- Littleleaf sumac
- Virginsbower

Low Value

- Scorpionweed
- Desertholly
- Mexican sagewort
- Fleabane
- Jimsonweed
- Buffalobur
- Wild rabbit tobacco
- Catclaw mimosa
- Other shrubs

(b) Sheep

Primary

- Globemallow
- Verbena
- Indian blanket
- Peppergrass mustard
- Wooly Indian-wheat
- Annual sunflower
- Texas filaree
- Arizona filaree
- Vine-mesquite
- Sideoats grama
- Plains bristlegrass
- Blue grama
- Black grama
- Bush muhly
- Buffalograss
- Fourwing saltbush
- Littleleaf sumac

Secondary

- Halfshrub sundrop
- Mexican sagewort
- Fleabane
- Tansyleaf aster
- Other annual forbs
- Cane bluestem
- Arizona cottontop
- White tridens
- Twoflower trichloris
- Giant sacaton
- Alkali sacaton
- Tobosa
- Hooded windmillgrass
- Silver bluestem
- Slim tridens
- Other annual grasses
- Virginsbower

Low Value

- Scorpionweed
- Desertholly
- Sensitive briar
- Wild rabbit tobacco
- Jimsonweed
- Buffalobur
- Burrograss
- Tornillo
- Mesquite
- Catclaw mimosa
- Viscid acacia
- Knifeleaf condalia
- Brickellbush
- American tarbush
- Desertwillow
- New Mexico walnut

(c) Goats

Primary

Fourwing saltbush
Littleleaf sumac
Virginsbower
Verbena
Texas filaree
Arizona filaree

Secondary

Tornillo
Mesquite
Catclaw mimosa
Viscid acacia
Knifeleaf condalia
Brickellbush
Desertwillow
New Mexico walnut
Globemallow
Indian blanket
Halfshrub sundrop
Sensitive briar
Mexican sagewort
Other perennial grasses
Other annual grasses

Low Value

American tarbush
Scorpionweed
Desertholly
Fleabane
Other perennial forbs
Other annual forbs
White tridens
Slim tridens
Burrograss

(d) Deer

Primary

Fourwing saltbush
Littleleaf sumac
Virginsbower
Desertwillow
Brickellbush
Globemallow
Verbena
Halfshrub sundrop
Mexican sagewort

Secondary

Other shrubs
Sideoats grama
Vine-mesquite
Other perennial forbs
Other annual forbs

Low Value

Other perennial grasse
Other annual grasses

(e) Antelope

Primary

Plains bristlegrass
Globemallow
Verbena
Indian blanket
Halfshrub sundrop
Tansyleaf aster
Peppergrass mustard
Annual sunflower
Texas filaree
Buffalobur
Other annual forbs
Fourwing saltbush

Secondary

Arizona cottontop
White tridens
Giant sacaton
Tobosa
Vine-mesquite
Sideoats grama
Blue grama
Other perennial grasses
Fleabane
Wooly Indian-wheat
Other perennial forbs
Brickellbush
Littleleaf sumac

Low Value

Cane bluestem
Alkali sacaton
Other shrubs

(f) Quail and Dove

Primary	Secondary	Low Value
Plains bristlegrass	Arizona cottontop	Cane bluestem
Vine-mesquite	White tridens	Alkali sacaton
Annual sunflower	Giant sacaton	Tobosa
Fourwing saltbush	Wooly Indian-wheat	Other perennial grasse
Mesquite	Sideoats grama	Other annual grasses
Tornillo	Slim tridens	Fleabane
Catclaw mimosa	Viscid acacia	Tansyleaf aster
	Littleleaf sumac	American tarbush
	Other shrubs	Desertwillow
	Other annual forbs	Other perennial forbs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:
   Roswell
   Portales
   Artesia
   Lovington
   Carlsbad
   Alamogordo

3. Field Office Sample Location:
   Lea County, New Mexico - N. E. 1/4 of Section 20, T. 25 S., R. 37 E., NMPM. East edge of village limits of Jal, New Mexico, on both sides of state highway #128, approximately 0.6 miles east of junction of highways 128 and 18.

4. Approved:

D. Sylvester 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-1-NTx Gravelly Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

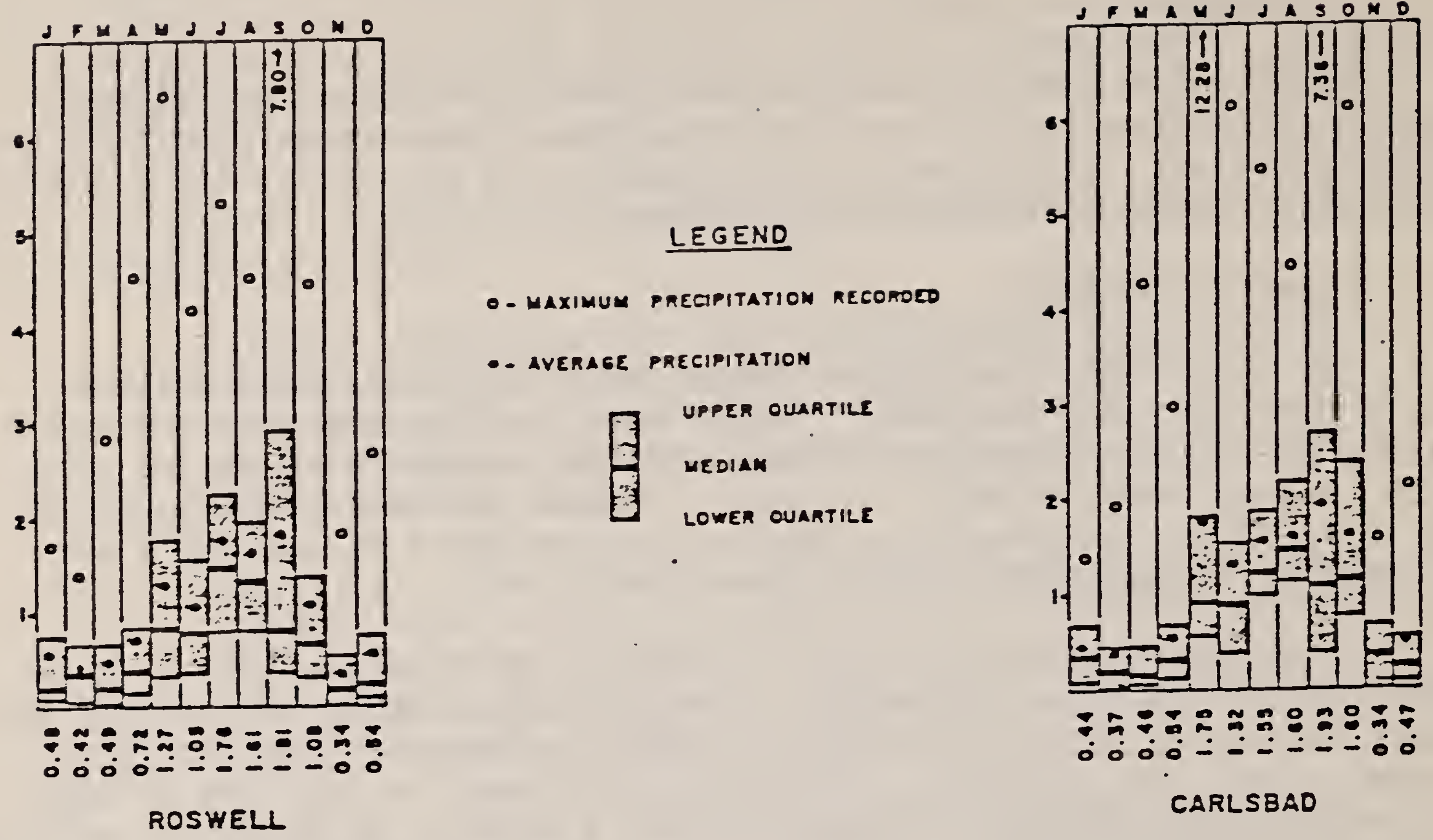
This site occurs on upland plains, fans, and mesas, or between toeslopes of desert hills and drainageways. Slopes range from zero to fifteen percent. Direction of slope varies and is not usually significant. Elevations range from 3,200 to 4,500 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils are dominantly very shallow and shallow gravelly loam and gravelly fine sandy loams. They are well drained. Some deep, gravelly soils are included. The gravelly top soil ranges from 4 to 20 inches and averages less than 10 inches. An indurated caliche layer usually occurs at less than 20 inches except for the deep gravelly soils. The soils have moderate and moderately rapid permeabilities with a low water-holding capacity. The plant-soil-air-water relationships are good. Water is commonly held available by the indurated caliche layer for short periods for plant use.

Because of the soils being well drained, sloping, and their inability to store water for long periods, if unprotected by grass and organic residues, runoff is high and erosion becomes severe - thus the site has a droughthy appearance.

2. Some soil taxonomic units are:
   Agustin gravelly loam
   Chispa loam
   Courthouse gravelly fine sandy loam
   Delnorte very gravelly loam
   Los Tanos fine sandy loam
   Lozier gravelly loam, gently sloping (0-5 percent)
   Nickel gravelly loam
   Potter gravelly loam (as mapped in Eddy County, N.M.)
   Sanderson gravelly loam
   Simona gravelly fine sandy loam
   Tencee gravelly fine sandy loam
   Upton gravelly loam
   Vado very gravelly loam
   Vieja stony silty clay

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential plant community is dominated by bunch and stoloniferous short-grasses which are drought tolerant. Shrubs, half shrubs, and cacti are sparsely scattered and evenly distributed. Perennial and annual forbs are a minor component and least noticeable. The aspect of the site is that of a grassland with shrubs. Small, depressed microsites with deeper soils and mid-grasses occur within the site.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 65-75%	
Black grama	25-35
Bush muhly	8-12
Plains bristlegrass	2-4
Sideoats grama	2-4
Threeawns spp.	2-4
Slim tridens	2-4
Blue grama	2-3
Hairy grama	2-3
Sand dropseed	2-3
Spike dropseed	2-3
Tobosa	1-3
Burrograss	1-3
Hairy tridens	1
Ear muhly	1
Fluffgrass	1
Annual grasses	1

(Shrubs, half shrubs, vines and trees) Woody - 15-25%	
Common javalinabush	1-3
Littleleaf sumac	1-3
Spiny allthorn	1-3
Condalia	1-3
Catclaw mimosa	1-3
Creosotebush	1-3
Mormon-tea	1-3
American tarbush	1-2
Range ratany	1-2
Broom snakeweed	1
Winterfat	1-3
Fourwing saltbush	1-2
Mariola	1-2
Yucca	1
Cactus	1
Tesajo cactus	1

Forbs - 5-15%	
Bladderpod	1-3
Senna	1-3
Leatherweed croton	1-3
Desert zinnia	1-2
Wooly paperflower	1-2
Wooly groundsel	0-1
Prickleaf dogweed	1-2
Stemless actinea	1-2
Globemallow	1-2
Verbena	1-2
Deerstongue	1
Other annual forbs	1

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	13
Trees and shrubs - canopy	7
Bare ground	50
Surface gravel	15
Surface cobble and stones	8
Litter - percent of area	7
average depth in cm.	2

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years - 800 pounds per acre
Median years - 600 pounds per acre
Unfavorable years - 300 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It is well suited to grazing by all classes of cattle and horses. If protection from, or control of, predators can be provided, it is also well suited to grazing by sheep and goats.

2. Wood Products

The trunks and branches of dead cholla found on this site are attractive and often used for flower arrangements, lamps, and other curiosities. These are not abundant on the site, however, unless it has deteriorated considerably from its natural potential vegetation. Otherwise this site does not provide wood products of any significant value.

3. Habitat for Wildlife

This range site provides habitats which suport a resident animal community that is characterized by desert cottontail, spotted ground squirrel, Merriam's kangaroo rat, cactus mouse, white-throated woodrat, gray fox, spotted skunk, roadrunner, Swainson's hawk, white-necked raven, cactus wren, pyrrhuloxia, lark sparrow, mourning dove, scaled quail, leopard lizard, round-tailed horned lizard, prairie rattlesnake, Couch's spadefoot toad, marbled whiptail, and greater earless lizard.

Where associated with Limestone Hills, mule deer utilize this site. Where large woody shrubs occur, most resident birds and scissor-tailed flycatcher, mourning dove, lark sparrow and Swainson's hawk nest.

4. Hydrological Interpretations

The hydrologic group for soils included in this site is B, C, and D. When the hydrologic condition of the vegetation cover is optimum, the hydrologic cover is about 85 to 90.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, rock hunting, nature photography and bird hunting. During years of abundant spring moisture, a colorful array of wild flowers is displayed during May and June. A few summer and fall flowers also occur.

6. Endangered Plants and Animals

Presently, there are no known endangered plants which are a part of the natural potential vegetation on this site. As these become known, they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	3.5-4.4
Good (75-51)	4.1-5.5
Fair (50-26)	5.3-9.5
Poor (25-0)	9.0 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Plains bristlegrass	Blue grama	Fluffgrass
Sideoats grama	Hairy grama	Hairy tridens
Black grama	Slim tridens	Burrograss
Bush muhly	Tobosa	Ear muhly
Fourwing saltbush	Sand dropseed	Threeawns spp.
Winterfat	Spike dropseed	Cactus
Mormon-tea	Globemallow	Broom snakeweed

(b) Sheep

Primary	Secondary	Low Value
Bladderpod	Littleleaf sumac	Catclaw mimosa
Leatherweed croton	Mariola	Spiny allthorn
Globemallow	Hairy tridens	Prickleaf dogweed
Plains bristlegrass	Slim tridens	Creosotebush
Sideoats grama	Blue grama	Cactus
Black grama	Senna	Wooly groundsel
Winterfat	Fourwing saltbush	Paperflower
Verbena		Fluffgrass
Annual forbs		

(c) Goats

Primary	Secondary	Low Value
Range ratany	Broom snakeweed	Creosotebush
Mariola	American tarbush	Wooly groundsel
Littleleaf sumac	Annual forbs	Threeawns spp.
Bladderpod	Catclaw mimosa	Burrograss
Fourwing saltbush	Blue grama	Hairy tridens
Winterfat	Black grama	Ear muhly
Plains bristlegrass	Common javalinabush	
Sideoats grama	Tobosa	
Mormon-tea	Condalia	

(d) Antelope

Primary	Secondary	Low Value
Globemallow	Mormon-tea	Creosotebush
Desert zinnia	Tobosa	Catclaw minosa
Bladderpod	Littleleaf sumac	Common javalinabush
Senna	Fourwing saltbush	Burrograss
Verbena	Blue grama	Fluffgrass
Annual forbs	Black grama	Threeawns spp.
Plains bristlegrass	Sideoats grama	Slim tridens
Leatherweed croton		Yucca
Broom snakeweed		
Range ratany		

(e) Quail

Primary	Secondary	Low Value
Plains bristlegrass	Sand dropseed	Threeawns spp.
Black grama	Condalia	Burrograss
Bladderpod	Sideoats grama	Tarbush
Senna	Annual forbs	
Mariola	Globemallow	
Catclaw mimosa		
Tesajo cactus		
Leatherweed croton		
Common javalinabush		

(f) Mourning dove

Primary	Secondary	Low Value
Croton	Fluffgrass	Hairy tridens
	Plains bristlegrass	Black grama
	Senna	Threeawns spp.
	Bladderpod	Burrograss
	Prickleaf dogweed	Tobosa
	Broom snakeweed	Common javalinabush
	Range ratany	Littleleaf sumac
		Tesajo cactus

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices (New Mexico):
   Roswell
   Artesia
   Portales
   Truth or Consequences
   Lovington
   Carlsbad
   Alamogrodo

   Field Offices (Texas):
   Dell City

3. Field Office Sample Location
   Lea County, New Mexico - SW 1/4 Section 1, T. 24 S., R. 35 E. NMPM.

   Soil Survey Sheet #151 Lea Soil Survey.
   Woolsworth Estate Ranch (John Post, lessee)

   Upton gravelly loam portion of Simona-Upton association M.U. SR

4. Approved:

11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

> Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.
>
> Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.
>
> Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-13-NTx Gyp Hills Range Site (SD-2 & 3)

B. PHYSIOGRAPHIC FEATURES

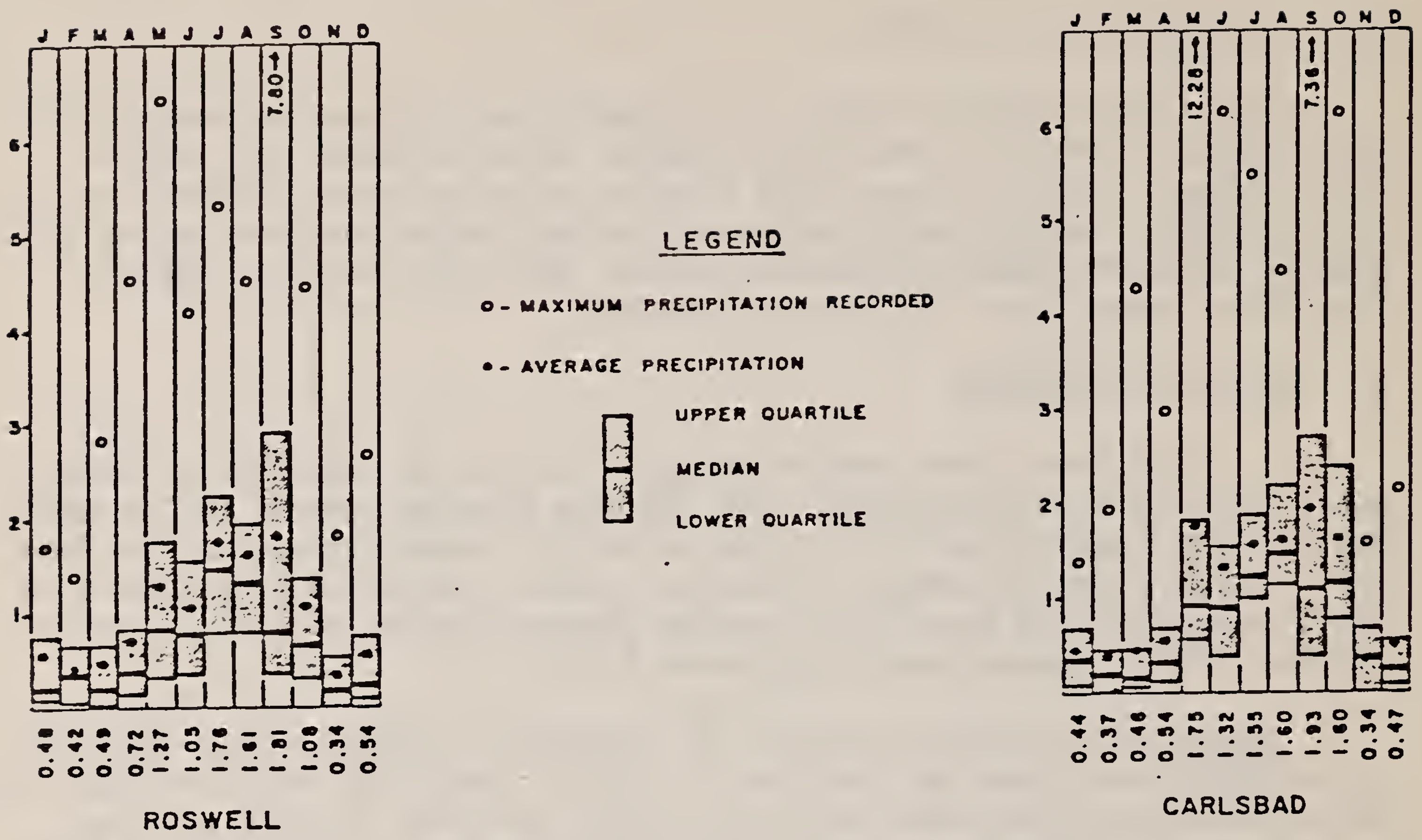
This site occurs on hills, escarpments and breaks between higher and lower plains or terraces, and canyon sides between deep desert drainageways. Slopes range from sloping to very steep. Direction of slope varies, the northern exposures having cooler and more moist soils, and the southern exposures having hotter and drier soils in general. Elevations range from 2,500 to 4,000 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



ROSWELL

CARLSBAD

RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils of this site are very shallow and well to somewhat excessively drained. The surface layers are loam, fine sandy loam, and gravelly loam overlying dense layers of cemented gypsum material or gypsum rock at depths of less than 8 inches - the gypsum rock and gypsum materials commonly outcrop to the surface as inclusions of rock outcrop or raw gypsumland which are void of vegetation and not part of the range site. In general, the greater the slope, the greater the amount of gypsum and rock outcrop. The gypsum materials and gypsum rock are restrictive to root development. Also included within the site delineation are pockets of deeper soil material of the loamy range site. The soils have moderate permeability and very low water-holding capacity. The plant-soil-air-water relationship is poor. The site has a droughty appearance due to the soil's inability to support a dense stand of vegetation. If unprotected by plant cover and organic residue, the soil becomes easily water eroded.

2. Some soil taxonomic units are:
Cottonwood loam, very shallow, less than 8 inches thick, greater than 9 percent slopes
Holloman loam, very shallow, less than 8 inches thick, greater than 9 percent slopes
McCarran loam, very shallow, less than 8 inches thick, greater than 9 percent slopes
Yesum fine sandy loam, less than 8 inches thick, greater than 9 percent slopes
Alamogordo fine sandy loam, less than 8 inches thick, greater than 9 percent slopes
Aztec gravelly loam (as mapped in Otero County, New Mexico)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The general aspect of this site is that of a rough, broken badlands, sparsely vegetated and highly dissected. There is more of the surface area comprised of bare ground and rock than that which is vegetated. The map delineations of this site are in actuality a complex of bare ground, rock outcrop, a few deep soil pockets in cracks and fissures of the bed rock, and areas of very shallow soils. The vegetation on the very shallow soil areas is dominated by rhizomatous and stoloniferous short grasses and forbs. Shrubs and half shrubs are apparent and rather unevenly distributed. The potential plant community varies somewhat with depth of soil, exposure and slope. Large bare areas with only surface lichens are common. Where there is little or no soil over the gypsum material, only rough coldenia may be present.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 30-50%	
*Gyp grama)	20-30
*Black grama)	
*Gyp dropseed)	10-15
Bristle panicum)	
*Threeawns spp.)	1-5
Fluffgrass)	

(Shrubs, half shrubs vines and trees) Woody - 15-25%	
*Littleleaf sumac)	5-10
*Fourwing saltbush)	
Spiny allthorn)	5-7
Knifeleaf condalia)	
*Soaptree yucca)	
Algerita.)	3-5
Creosotebush)	
Prickleaf dogweed)	1-3
Cactus)	

Forbs - 30-50%	
Coldenia	15-25
Nama)	
Flax)	
Stickleaf)	5-10
Scorpionweed)	
Threadleaf groundsel)	
Penstemon)	
Wooly gaura)	
Paperflower)	5-10
Devils claw)	
Halfshrub sundrop)	
Gyp buckwheat)	1-5
Other annual forbs)	

* See SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	16
Trees and shrubs - canopy	6
Bare ground	42
Surface gravel	14
Surface cobble and stones	10
Litter - percent of area	12
average depth in cm.	1

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years	-	300 pounds per acre
Median years	-	250 pounds per acre
Unfavorable years	-	100 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

About 75 percent of the area within map delineations of this site is non-suitable for domestic livestock grazing because of steep slope, rock outcrop and lack of forage. Grazing is least damaging to this sparse vegetative cover during fall and winter. The site is best utilized by goats or yearling cattle following seasons of abundant moisture. During normal or unfavorable years the plants are adequately utilized by native fauna. This site should not be depended on to furnish needed forage for perennial livestock breeding operations but can furnish some incidental grazing in conjunction with adjacent sites in the same pastures.

2. Wood Products

This site provides little or no wood products other than curiosities and small furniture which can be made from the roots and stems of mesquite where it has invaded. The woody pods of devilsclaw are also used in curiosities.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by bobcat, gray fox, black-tailed jackrabbit, rock squirrel, rock pocket mouse, red-tailed hawk, scaled quail, loggerhead shrike, Texas horned lizard, lesser earless lizard, and western diamondback rattlesnake.

Where closely associated with high cliffs and ledges as in the Guadelupe and Sacramento mountains, golden eagle and prairie falcon hunt over the site.

Fourwing saltbush, littleleaf sumac, spiny allthorn, and knifeleaf condalia provide protective cover for scaled quail. Fourwing saltbush and littleleaf sumac are browsed by desert mule deer. Seed, green herbage and fruit from a variety of grasses, forbs, and shrubs provide food for a number of birds and mammals, including dove and quail.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Cottonwood	C
Holloman	C
McCarran	C
Yesum	B
Alamogordo	B
Aztec	B

Approximate hydrologic curve number when the hydrologic cover is optimum: B Soils - 77; C Soils - 85.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, rock, gem, and mineral collecting, nature observation and photography, relict hunting, and quail, dove, and predator hunting.

The broken landscape and exposed lichen coated rock is quite contrasting to the flatness of the surrounding desert areas, making it aesthetically refreshing. During years of abundant moisture, a colorful array of wildflowers can be observed from spring through fall.

6. Endangered Plants and Animals

The only known endangered plant to exist in the potential plant community of this site is Eriogonum gypsophilum (gyp buckwheat). It is present in plentiful populations, regardless of ecological condition. Grazing use by domestic livestock has not been observed on this plant.

Presently there are no known endangered animals which are indigenous to this site. As these become known they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	7.5-10.0
Good (75-51)	9.5-13.0
Fair (50-26)	13.1-19.0
Poor (25-0)	30.0 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
Black grama
Gyp grama
Stickleaf
Fourwing saltbush
Mormon-tea

Secondary
Gyp dropseed
Bristle panicum
Soaptree yucca
Littleleaf sumac
Penstemon
Wooly gaura
Halfshrub sundrop
Flax

Low Value
Threeawns spp.
Fluffgrass
Other shrubs
Coldenia
Other perennial forbs
Other annual forbs

(b) Goats

Primary
Littleleaf sumac
Fourwing saltbush
Mormon-tea
Stickleaf

Secondary
Knifeleaf condalia
Algerita
Cactus
Flax
Penstemon
Paperflower
Halfshrub sundrop
Other annual forbs
Black grama
Gyp grama
Bristle panicum
Gyp dropseed

Low Value
Spiny allthorn
Soaptree yucca
Creosotebush
Prickleaf dogweed
Other perennial forbs
Threeawns spp.
Fluffgrass

(c) Dove and Quail

Primary
Bristle panicum
Fourwing saltbush
Penstemon

Secondary
Flax
Fluffgrass
Wooly gaura
Littleleaf sumac
Spring allthorn
Knifeleaf condalia

Low Value
Other perennial grasse
Creosotebush
Other shrubs
Other annual forbs
Other perennial forbs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:

New Mexico	Texas
Roswell	Dell City
Portales	
Lovington	
Artesia	
Alamogordo	
Carlsbad	
Las Cruces	
Truth or Consequences	
Socorro	

3. Field Office Sample Location:
   Eddy County, New Mexico - Southwest corner of Northwest Quarter, Section 27, Township 26 S., Range 24 E., NMPM. 2 1/4 miles N. E. of the Texas-New Mexico state line, on the west side of highway 180 on the A. M. Leeman Ranch. GA Mapping Unit, Map Sheet 148 insert, Eddy Area, New Mexico Soil Survey Report.

4. Approved:

D. Sylvester 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-6-NTx Gyp Upland Range Site (SD-2 & 3)

B. PHYSIOGRAPHIC FEATURES

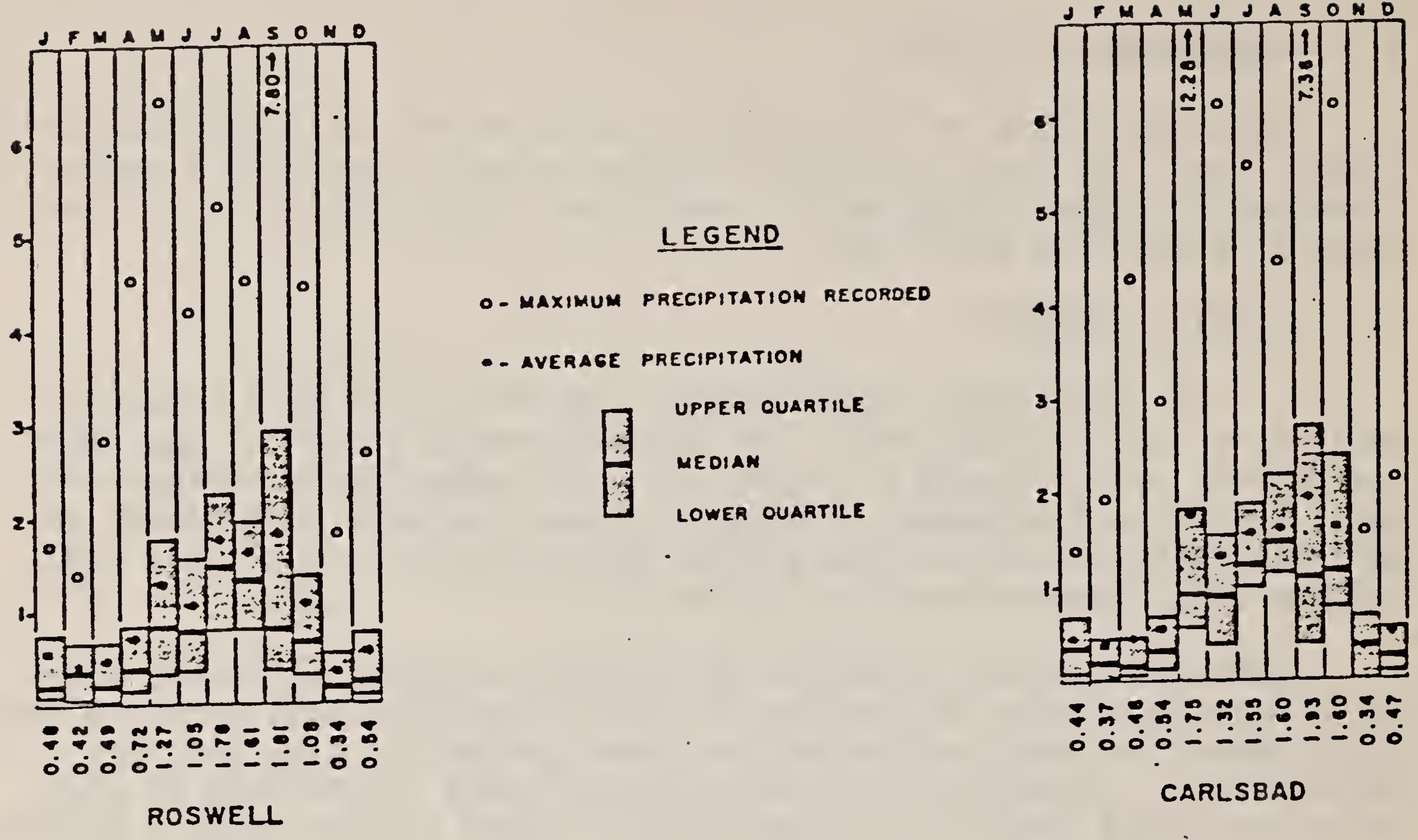
This site occurs on plains and terraces between desert drainageways. Slopes range from level to gently sloping, usually less than 9 percent. Direction of slope varies and is usually not significant. Elevations range from 2,500 to 3,800 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

The soils of this site are very shallow and well drained. The surface layers are loam and fine sandy loam overlying dense layers of soft or cemented gypsum material and gypsiferous earth at depths less than 8 inches. The gypsum materials commonly outcrop to the surface as inclusions of raw gypsumland which are void of vegetation and not part of the range site. In the lower part of the profile the semi-indurated gypsum and caliche make up about 75 percent of the mass and are restrictive to root development. The soils have moderate permeability. Water-holding capacity is very low. The plant-soil-air-water relationship is poor. The site has a droughty appearance because of the soils's inability to support a dense stand of vegetation. If unprotected by plant cover or organic residue, the soil becomes easily wind blown and water eroded.

2. Some soil taxonomic units are:
   Cottonwood loam, very shallow, less than 8 inches thick
     (as mapped in Lea County, New Mexico)
   Holloman loam, very shallow, less than 8 inches thick
   McCarran loam, very shallow, less than 8 inches thick
   Yesum fine sandy loam, less than 8 inches thick
   Alamogordo fine sandy loam, less than 8 inches thick

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The aspect of this site is a patchy, short-grass grassland with patches of bare or lichen covered soil surface exposed between patches of vegetation. The potential plant community is dominated by short- and mid-grasses and forbs, with half shrubs and shrubs sparsely and evenly distributed. Vegetative ground cover is sparse. Vegetation varies considerably with soil depth and amount of gypsum outcrop. Where there is little or no soil depth only rough coldenia may be present.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 60-80%		(Shrubs, half shrubs, vines and trees) Woody - 5-15%		Forbs - 10-25%	
*Alkali sacaton	15-20	*Fourwing saltbush)	3-7	*Coldenia	5-1
*Black grama)	30-35	*Mormon-tea)	3-7	Nama)	
*Gyp grama)		Littleleaf sumac)		*Leatherweed croton)	
*Plains bristlegrass)		Spiny allthorn)		Paperflower)	1-5
Bush muhly)	3-5	Knifeleaf condalia)	1-3	Threadleaf groundsel)	
Bristle panicum)		Common javelinabush)		Hopitea greenthread)	
*Gyp dropseed)		Creosotebush)	1-3	Penstemon)	
Sand dropseed)	5-10	Tesajo cactus)		Wooly gaura)	
Blue grama)		*Soaptree yucca)		Trailing four-)	
*Threeawns spp.)		Small soapweed)	1-3	o'clock)	
Ear muhly)	5-10	Redjoint pricklypear)		Scorpionweed	
Burrograss)				Skunk daisy	
Fluffgrass)				Milkwart)	
				*Halfshrub sundrop)	
				Coreopsis)	
				Stickleaf)	
				Gyp buckwheat)	1-5
				Devils claw)	
				*Other annual forbs)	

* See Forms SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	21
Trees and shrubs - canopy	8
Bare ground	38
Surface gravel	9
Surface cobble and stones	8
Litter - percent of area	16
average depth in cm.	1

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years	-	600 pounds per acre
Median years	-	500 pounds per acre
Unfavorable years	-	200 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. Care must be taken to leave enough vegetative cover for soil protection during windy and rainy periods or severe soil erosion will result. About 300 pounds per acre of total vegetation and litter is minimal for soil protection. This site is best suited and most efficiently utilized by cattle. It can also be utilized by minority proportions of goats and sheep in combination with cattle where control or protection from predators can be provided.

2. Wood Products

This site provides little or no wood products other than curiosities and small furniture which can be made from the roots and stems of mesquite where it has invaded the site. The woody pods of devils claw are also used in curiosities.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by coyote, hooded skunk, desert cottontail, whitethroated, woodrat, sparrow hawk, cactus wren, scaled quail, loggerhead shrike, mourning dove, Texas horned lizard, lesser earless lizard, and western diamondback rattlesnake.

Fourwing saltbush, littleleaf sumac, spiny allthorn, common javalinabush, and knifeleaf condalia provide protective cover for scaled quail. Seed, green herbage and fruit from a variety of grasses, forbs and shrubs provide food for a number of birds and mammals, including scaled and Gambel's quail, mourning dove and prairie dogs. The fruit of tesajo cactus is relished by quail.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Cottonwood	C
Holloman	C
McCarran	C
Yesum	B
Alamogordo	B

Approximate hydrologic curve number when the hydrologic cover is optimum: B Soils - 74; C Soils - 83.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, rock, gem, and mineral collecting, nature observation and photography, relict hunting, and quail, dove, and predator hunting.

During years of abundant moisture, a colorful array of wildflowers can be observed from spring through fall.

6. Endangered Plants and Animals

The only known endangered plant to exist in the potential plant community of this site is Eriogonum gypsophilum (Gyp Buckwheat). It is present in plentiful populations regardless of ecological condition. Grazing use by domestic livestock has not been observed on this plant.

Presently there are no known endangered animals which are indigenous to this site. As these become known, they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	5.5-8.0
Good (75-51)	7.5-11.0
Fair (50-26)	11.0-15.0
Poor (25-0)	25.0 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Alkali sacaton	Bristle panicum	Threeawns spp.
Black grama	Gyp dropseed	Fluffgrass
Blue grama	Sand dropseed	Other perennial forbs
Bush muhly	Ear muhly	Other annual forbs
Gyp grama	Burrograss	Spiny allthorn
Plains bristlegrass	Penstemon	Knifeleaf condalia
Hopitea greenthread	Wooly gaura	Common javelinabush
Stickleaf	Trailing four-o'clock	Creosotebush
Fourwing saltbush	Halfshrub sundrop	Tesajo cactus
Mormon-tea	Coreopsis	Redjoint pricklypear
	Littleleaf sumac	
	Soaptree yucca	
	Small soapweed	

(b) Quail and Dove

Primary
Plains bristlegrass
Bristle panicum
Leatherweed croton
Penstemon
Stickleaf
Fourwing saltbush
Common javelinabush
Tesajo cactus

Secondary
Fluffgrass
Wooly gaura
Littleleaf sumac
Spiny allthorn
Knifeleaf condalia

Low Value
Other perennial grasse
Other perennial forbs
Other annual forbs
Creosotebush
Other shrubs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:

   New Mexico
   Roswell
   Portales
   Lovington
   Artesia
   Alamogordo
   Carlsbad
   Las Cruces
   Truth or Consequences
   Socorro

   Texas
   Dell City

3. Field Office Sample Location:
   Eddy County, New Mexico - center of N. W. 1/4, Sec. 27, T. 26 S., R. 24 E., NMPM. 2 1/2 miles N. E. of the Texas-New Mexico state line, on the west side of Highway 180. A. M. Leeman Ranch. GC Mapping Unit, Cottonwood component. Map Sheet 148 insert, Eddy Area New Mexico Soil Survey Report.

4. Approved:

11/3/77
State Range Conservationist   Date

Regional Range Conservationist   Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-7-NTx Loamy Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

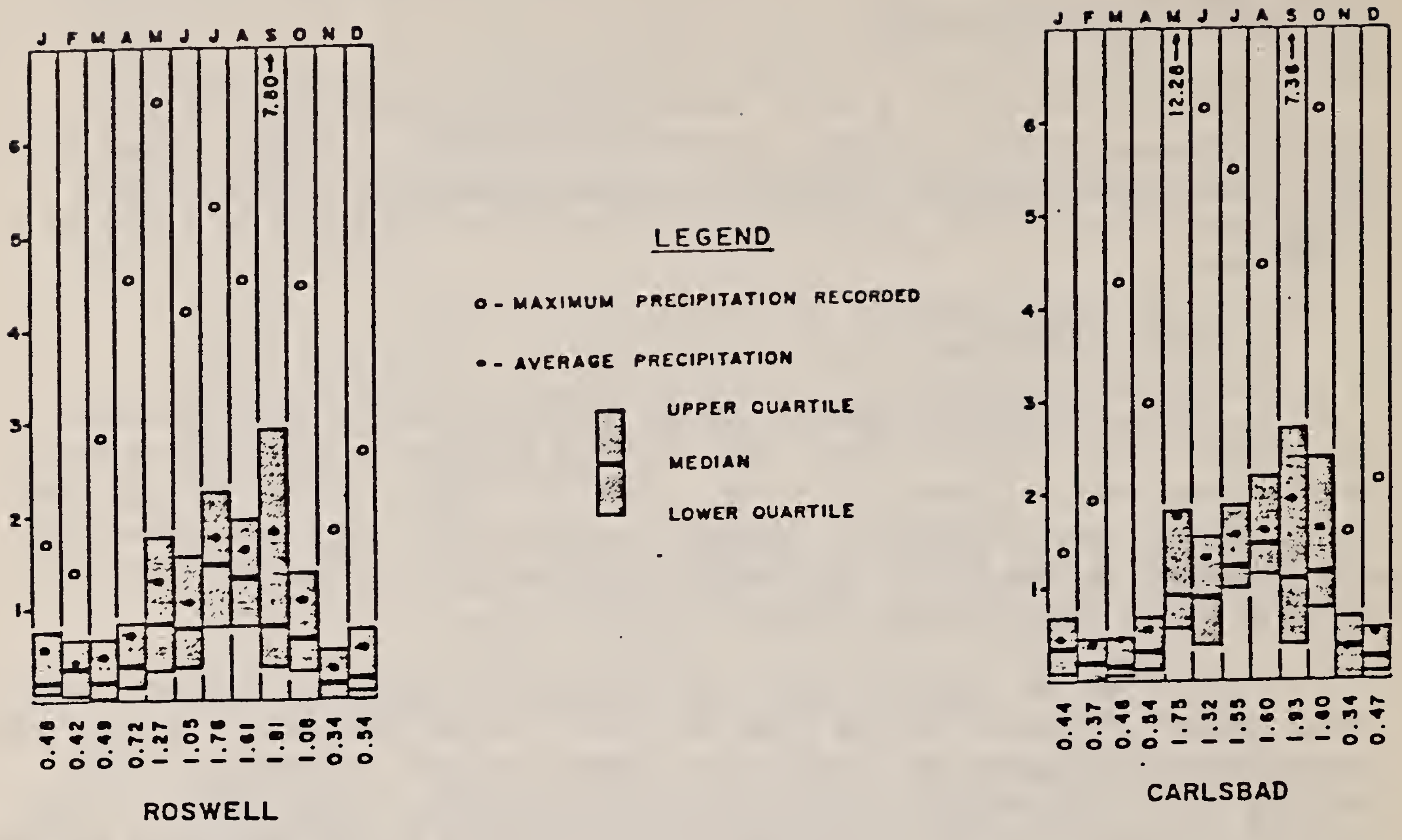
This site occurs on plains, drained or protected flood plains, broad terraces or fans between desert drainageways. Slopes range from level to gently sloping, usually less than 5 percent. Direction of slope varies and is not significant. Elevations range from 3,000 to 4,100 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils of this site are mostly deep to moderately deep and well drained. A few are shallow to gypsiferous material. The surface layers are loam, silt loam, silty clay loam, or clay loam. The underlying layers are loam, silty clay loam and clay loam. Permeability is moderate to slow. Available water-holding capacity is high to moderate. The plant-soil-air-water relationship is good.

2. Some soil taxonomic units are:
   Atoka loam
   Bigetty loam (protected)
   Cottonwood loam, greater than 8 inches thick
     (as mapped in Lea County, New Mexico)
   Hoban loam
   Hoban silty clay loam
   Hodgins silty clay loam
   Holloman loam, greater than 8 inches thick
   Largo loam
   Largo silt loam
   Mimbres silt loam
   Pima silt loam (protected)
   Reagan loam (as mapped in Eddy County, New Mexico)
   Reakor loam
   Reakor silty clay loam
   Reakor loam, gravelly substratum
   Reeves loam
   Reeves clay loam
   Russler silt loam
   Russler silty clay loam

F. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential plant community has a grassland aspect. It is dominated by drought tolerant short- and mid-grasses with shrubs and half shrubs sparse and evenly dispersed. There is an abundant variety of perennial forbs. These are in minor proportions during normal years but fluctuate in composition as do the ephemeral forbs with seasonal amount and distribution of rainfall. Small microsites occur in depressional positions within this site which have a higher proportion of mid-grasses. These areas receive additional run-in moisture and are heavier in production.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 85-95%	
*Tobosa)	35-40
*Burrograss)	
*Black grama)	25-30
*Blue grama)	
Sideoats grama	1-3
Bush muhly)	1-3
Plains bristlegrass)	
Arizona cottontop)	
Silver bluestem)	1-5
Cane bluestem)	
*Alkali sacaton	3-5
Threeawns spp.)	3-5
Sand dropseed)	
*Vine-mesquite	1-3
Sand muhly)	
Ear muhly)	3-5
Mat muhly)	
Creeping muhly)	
Other annual grasses	1-3

(Shrubs, half shrubs, vines and trees) Woody - 3-5%	
*Fourwing saltbush)	
*Mormon-tea)	1-3
*Small soapweed)	
*Winterfat)	
Walkingstick cholla)	
Broom snakeweed)	1-3
*Common javelinabush)	
Soaptree yucca)	

Forbs - 5-10%	
*Globemallow)	
*Verbena)	1-3
Hopitea greenthread)	
Threadleaf groundsel)	
Wooly groundsel)	
Desertholly)	
Scorpionweed)	1-3
*Leatherweed croton)	
Bladderpod	
Tansymustard	
Texas stickseed)	
Flax)	
Nama)	
Cutleaf haplopappus)	
Fleabane)	
Wooly paperflower)	1-3
Indian blanket)	
Groundcherry)	
Deerstongue)	
Rayless goldenrod)	
Wooly Indian-wheat)	
Senna)	
Hoffmanseggia)	
Locoweed)	
Peppergrass mustard)	1-3
Lyreleaf greeneye)	
Texas filaree)	
Arizona filaree)	

* See SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	52
Trees and shrubs - canopy	2
Bare ground	14
Surface gravel	4
Surface cobble and stones	0
Litter - percent of area	28
average depth in cm.	3

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years	-	1,200 pounds per acre
Median years	-	900 pounds per acre
Unfavorable years	-	650 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It is best suited and most efficiently utilized by cattle, sheep and horses in combination. Where sheep are grazed, protection from or control of predators is essential to an economic operation.

2. Wood Products

The natural potential plant community of this site affords little or no wood products. Where the site has been invaded by mesquite, the roots and stems of these plants provide attractive material for a variety of curiosities and small furniture.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, black-tailed prairie dog, yellow-faced pocket gopher, banner-tailed kangaroo rat, hispid cotton rat, swift fox, burrowing owl, horned lark, mockingbird, meadowlark, mourning dove, scaled quail, Great Plains toad, plains spadefoot toad, prairie rattlesnake and Western coachwhip snake.

Where large woody shrubs and soaptree yucca occur, Scott's oriole, Swainson's hawk, mourning dove and many resident birds nest. The marsh hawk hunts over this site in winter.

Fourwing saltbush and common javelinabush provide protective cover for scaled quail. Seed, green herbage and fruit from a variety of grasses, forbs, and shrubs provide food for a number of birds and mammals, including scaled quail, mourning dove, and antelope.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Atoka	C
Bigetty	C
Cottonwood	C
Hoban	B
Hodgins	B
Holloman	C
Largo	B
Mimbres	C
Pima	B
Reagan	B
Reakor	B
Reeves	C
Russler	C

Approximate hydrologic curve number when the hydrologic cover is optimum: B Soils - 63; C Soils - 75.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation, and photography, relict hunting, and quail, dove, antelope and predator hunting.

During years of abundant spring moisture this site displays a colorful array of wildflowers during May and June. A few summer and fall flowers also occur.

6. Endangered Plants and Animals

Presently there are no known endangered plants which are a part of the potential vegetation or endangered animals which are indigenous to this site. As these become known, they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	3.5-4.2
Good (75-51)	4.1-5.5
Fair (50-26)	5.3-7.0
Poor (25-0)	7.1 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
Black grama
Blue grama
Sideoats grama
Bush muhly
Plains bristlegrass
Arizona cottontop
Cane bluestem
Alkali sacaton
Vine-mesquite
Fourwing saltbush
Mormon-tea
Winterfat
Verbena
Hopitea greenthread
Texas filaree
Arizona filaree

Secondary
Tobosa
Burrograss
Silver bluestem
Sand dropseed
Ear muhly
Creeping muhly
Mat muhly
Other annual grasses
Small soapweed
Walkingstick cholla
Soaptree yucca
Globemallow
Bladderpod
Groundcherry
Flax
Wooly Indian-wheat
Senna

Low Value
Threeawns spp.
Sand muhly
Broom snakeweed
Common javelinabush
Threadleaf groundsel
Wooly groundsel
Desertholly
Leatherweed croton
Tansymustard
Nama
Cutleaf haplopappus
Fleabane
Wooly paperflower
Rayless goldenrod
Indian blanket
Deerstongue
Hoffmanseggia
Locoweed
Other annual forbs
Other perennial forbs
Other shrubs

(b) Sheep

Primary
Globemallow
Verbena
Hopitea greenthread
Leatherweed croton
Bladderpod
Indian blanket
Flax
Wooly Indian-wheat
Lyreleaf greeneye
Texas filaree
Arizona filaree
Other perennial forbs
Fourwing saltbush
Winterfat
Black grama
Blue grama
Sideoats grama
Bush muhly
Plains bristlegrass
Vine-mesquite

Secondary
Fleabane
Wooly paperflower
Groundcherry
Senna
Other annual forbs
Mormon-tea
Walkingstick cholla
Tobosa
Arizona cottontop
Silver bluestem
Cane bluestem
Alkali sacaton
Sand dropseed
Mat muhly
Creeping muhly

Low Value
Threadleaf groundsel
Wooly groundsel
Desertholly
Scorpionweed
Tansymustard
Texas stickseed
Nama
Cutleaf haplopappus
Deerstongue
Rayless goldenrod
Hoffmanseggia
Locoweed
Other annual grasses
Small soapweed
Soaptree yucca
Broom snakeweed
Common javelinabush
Burrograss
Threeawns spp.
Sand muhly
Ear muhly

(c) Antelope

Primary
Sideoats grama
Plains bristlegrass
Silver bluestem
Ear muhly
Fourwing saltbush
Broom snakeweed
Globemallow
Verbena
Leatherweed croton
Bladderpod
Flax
Wooly paperflower
Indian blanket
Groundcherry
Hopitea greenthread
Rayless goldenrod
Locoweed
Lyreleaf greeneye
Texas filaree
Arizona filaree

Secondary
Black grama
Burrograss
Tobosa
Blue grama
Bush muhly
Arizona cottontop
Sand dropseed
Vine-mesquite
Creeping muhly
Mat muhly
Other annual grasses
Nama
Cutleaf haplopappus
Fleabane
Deerstongue
Wooly Indian-wheat
Senna
Other annual forbs

Low Value
Cane bluestem
Alkali sacaton
Threeawns spp.
Other shrubs
Other perennial grasse
Other perennial forbs

(d) Dove and Quail

Primary
Scorpionweed
Leatherweed croton
Texas stickseed
Hoffmanseggia
Fourwing saltbush
Broom snakeweed
Common javelinabush
Plains bristlegrass
Other annual grasses

Secondary
Bladderpod
Flax
Cutleaf haplopappus
Wooly paperflower
Wooly Indian-wheat
Senna
Other annual forbs
Burrograss
Bush muhly
Sideoats grama
Arizona cottontop
Vine-mesquite

Low Value
Fleabane
Other perennial
Small soapweed
Soaptree yucca
Other shrubs
Tobosa
Black grama
Blue grama
Silver bluestem
Cane bluestem
Alkali sacaton
Other perennial grasse
Other perennial forbs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices:
   Roswell
   Portales
   Lovington
   Artesia
   Carlsbad
   Alamogrodo

3. Field Office Sample Location:
   Chaves County, New Mexico - S. E. 1/4, Section 12, T. 12 S., R. 24 E., NMPM Roswell Industrial Air Center, inside south chain link fence. Reakor loam.

4. Approved:

D. 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

The following definitions apply to cattle, sheep, goats, deer, and antelope grazing:

Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-4-NTx Sandy Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

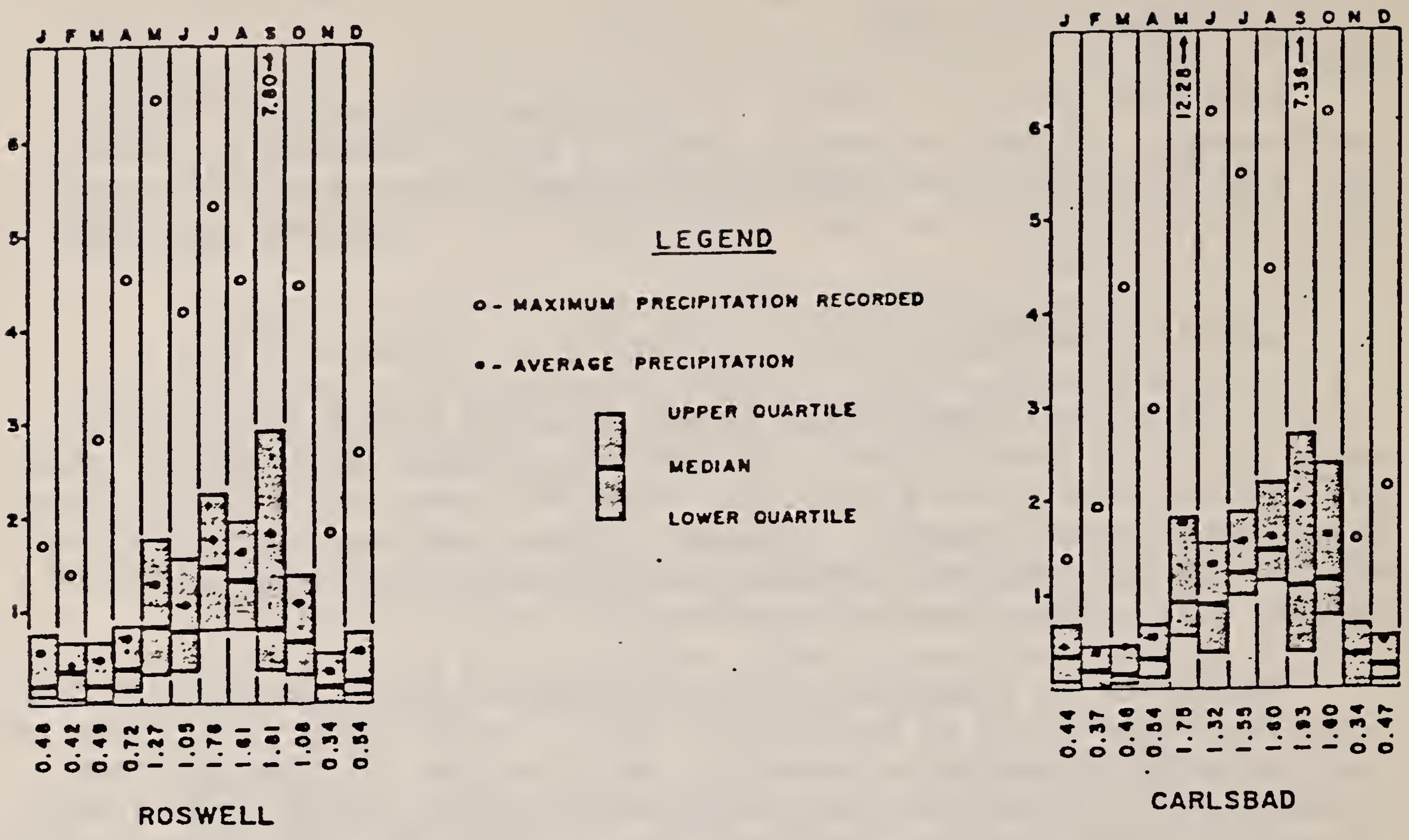
This site occurs on plains, fans, or terraces between desert drainageways. Slopes are nearly level to gently undulating, usually less than 5 percent. Low, stabilized hummocks may occasionally occur. Direction of slope varies and is not significant. Elevations range from 2,500 to 4,000 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils of this site are deep to moderately deep and well drained. A few shallow soils are included. The surface layer textures are fine sandy loam, sandy loam, and a few loam, loamy fine sand, and fine sand. Where the surface textures are loamy fine sand or coarser, a change of texture to a finer texture occurs within 20 inches of the surface. The underlying layers are of fine sandy loam, loam, sandy clay loam, and some clay loam. Lime layers either soft or indurated, caliche gravel fragments, or gypsiferous caliche often occur at depths between 20-40 inches or even deeper. The soils have moderately rapid to rapid permeability. Available water-holding capacity is moderate to high. The plant-soil-air-water relationship is good. Water enters the soils rapidly and is held by the underlying layers available for plant use. In the high lime layers, root penetration may be somewhat restricted. The soils, if unprotected by plant cover and organic residue, become windblown and low hummocks are formed.

2. Some soil taxonomic units are:
   Berino fine sandy loam
   Cacique fine sandy loam
   Cacique loamy fine sand (thin surface layer)
   Dona Ana fine sandy loam
   Grand Falls fine sandy loam, shallow
   Hoban loam
   Ima fine sandy loam
   Kinco fine sandy loam
   McCarran fine sandy loam 8" thick (as mapped in Ward Co., Tx)
   Midessa fine sandy loam (as mapped in Lea Co., N.M.)
   Mobeetie fine sandy loam (as mapped in Lea Co., N.M.)
   Monahans fine sandy loam
   Pajarito fine sandy loam (as mapped in S. Chaves Co., N.M.)
   Pajarito loamy fine sand (thin surface layer) (as mapped in in S. Chaves Co., N.M.)
   Reakor sandy loam (as mapped in S. Chaves Co., N.M.)
   Wickett fine sandy loam
   Wink fine sandy loam
   Wink fine sand (as mapped in Lea Co., N.M.)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The potential plant community has a grassland aspect. It is dominated by mid- and short-grasses with shrubs sparse and evenly dispersed. There is an abundant variety of perennial forbs. Ephemeral forbs are a characteristic component and occasionally appear as aspect dominates. The annual grass and forb population fluctuates considerably from year to year with annual and seasonal variation in both amount and seasonal distribution of precipitation. The perennial grass and forb population fluctuates less drastically.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 70-80%	
*Black grama	35-40
Blue grama	5-10
*Bush muhly	3-5
*Sand dropseed)	
Spike dropseed)	10-15
Mesa dropseed)	
*Threeawns spp.	3-5
*Plains bristlegrass	3-5
Arizona cottontop	3-5
Silver bluestem	3-5
Vine-mesquite	1-3
Tobosa	1-3
*Little bluestem	1-3
Fall witchgrass	1-3
Slim tridens	1-3
Almejita signalgrass	1-3
Other annual grasses	1-5

(Shrubs, half shrubs, vines and trees) Woody - 5-10%	
*Small soapweed	1-5
Catclaw mimosa)	1-3
Pale wolfberry)	
Lotewood condalia)	1-3
*Fourwing saltbush)	
*Mormon-tea)	1-3
Common javelinabush)	
Broom snakeweed)	1-3
Sand sagebrush)	

Forbs - 10-20%	
Plains tickseed)	
*Leatherweed croton)	3-7
Plains blackfoot)	
*Globemallow)	
Scorpionweed)	
Nama)	3-7
Wooly gaura)	
Wooly dalea)	
Wooly groundsel)	
Curlycup gumweed)	
Spectaclepod mustard)	
Bladderpod mustard)	
Menodora)	
Cutleaf Haplopappus)	
*Stickleaf)	
Prickly lettuce)	1-3
Lambsquarters)	
Arizona filaree)	
Texas filaree)	
Wooly Indian-wheat)	3-7
Annual wild buckwheat)	
*Other annual forbs)	

* See Forms SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	34
Trees and shrubs - canopy	10
Bare ground	16
Surface gravel	0
Surface cobble and stones	0
Litter - percent of area	40
average depth in cm.	2

There are no significant overstory tree species in the potential plant community on this site, however, as retrogression occurs, mesquite invades readily.

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years	-	1,100 pounds per acre
Median years	-	900 pounds per acre
Unfavorable years	-	600 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. This site is best suited and most efficiently utilized by cattle. It could be utilized by minor proportions of sheep and goats in combination with cattle if protection from, or control of, predators can be provided.

2. Wood Products

The natural potential plant community of this site affords little or no wood products. Where the site has been invaded by mesquite, the roots and stems of these plants provide attractive material for a variety of curiosities and small furniture.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, spotted ground squirrel, black-tailed prairie dog, yellow-faced pocket gopher, Ord's kangaroo rat, Northern grasshopper mouse, Southern plains woodrat, badger, meadowlark, roadrunner, burrowing owl, white-necked raven, cactus wren, pyrrhuloxia, lesser prairie chicken, mourning dove, scaled quail, Harris' hawk, side-blotched lizard, marbled whiptail, Texas horned lizard, prairie rattlesnake, plains spadefoot toad, and ornate box turtle.

Where mesquite has invaded, most resident birds and scissor-tailed flycatcher, mourning dove and Swainson's hawk nest. Where sand hummocks form around shrubs, rodent populations and their predators increase. Vesper and grasshopper sparrows utilize the site during migration. Fourwing saltbush, catclaw mimosa, lotewood condalia, and common javelinabush provide protective cover for scaled quail. Seed, green herbage and fruit from a variety of grasses, forbs, and shrubs provide food for a number of birds and mammals, including mourning dove, scaled quail, and antelope.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Berino	B
Cacique	C
Dona Ana	B
Hoban	B
Ima	B
Kinco	A
Midessa	B
Mobeetie	B
Pajarito	B
Reakor	B
Wickett	C
Wink	B

Approximate hydrologic curve number when the hydrologic cover is optimum: A Soils - 39; B Soils - 64; C Soils - 76.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation, and photography, relict hunting, and quail, dove, antelope, and predator hunting.

During years of abundant spring moisture, this site displays a colorful array of wildflowers during May and June. A few summer and fall flowers also occur.

6. Endangered Plants and Animals

Presently there are no known endangered plants which are a part of the potential vegetation or endangered animals which are indigenous to this site. As these become known they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	2.7-3.8
Good (75-51)	3.5-5.0
Fair (50-26)	5.0-8.0
Poor (25-0)	8.1 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary	Secondary	Low Value
Black grama	Tobosa	Other annual grasses
Little bluestem	Signalgrass	Threeawns spp.
Blue grama	Silver bluestem	Plains tickseed
Bush muhly	Slim tridens	Leatherweed croton
Plains bristlegrass	Fall witchgrass	Nama
Arizona cottontop	Sand dropseed	Wooly gaura
Vine-mesquite	Spike dropseed	Scorpionweed
Plains blackfoot	Mesa dropseed	Wooly groundsel
Texas filaree	Globemallow	Curlycup gumweed
Arizona filaree	Wooly dalea	Cutleaf haplopappus
Stickleaf	Spectaclepod mustard	Annual wild buckwheat
Fourwing saltbush	Bladderpod mustard	Catclaw mimosa
Mormon-tea	Menodora	Pale wolfberry
	Lambsquarters	Lotewood condalia
	Prickly lettuce	Common javelinabush
	Wooly Indian-wheat	Broom snakeweed
	Small soapweed	Sand sagebrush

(b) Antelope

Primary	Secondary	Low Value
Leatherweed croton	Wooly gaura	Tobosa
Plains blackfoot	Curlycup gumweed	Lotewood condalia
Globemallow	Cutleaf haplopappus	Wooly groundsel
Spectaclepod mustard	Wooly Indian-wheat	Pale wolfberry
Bladderpod	Black grama	Catclaw mimosa
Stickleaf	Blue grama	
Lambsquarters	Bush muhly	
Arizona filaree	Sand dropseed	
Texas filaree	Spike dropseed	
Annual wild buckwheat	Mesa dropseed	
Other annual forbs	Arizona cottontop	
Plains bristlegrass	Silver bluestem	
Broom snakeweed	Vine-mesquite	
Fourwing saltbush	Little bluestem	
	Fall witchgrass	
	Slim tridens	
	Mormon-tea	

(c) Quail and Dove

Primary	Secondary	Low Value
Plains bristlegrass	Sand dropseed	Black grama
Plains tickseed	Mesa dropseed	Blue grama
Leatherweed croton	Spike dropseed	Threeawns spp.
Plains blackfoot	Arizona cottontop	Small soapweed
Globemallow	Silver bluestem	Lotewood condalia
Wooly gaura	Vine-mesquite	Pale wolfberry
Bladderpod	Tobosa	
Menodora	Little bluestem	
Stickleaf	Fall witchgrass	
Lambsquarters	Slim tridens	
Arizona filaree	Curlycup gumweed	
Other annual forbs	Spectaclepod mustard	
Fourwing saltbush	Cutleaf haplopappus	
Common javelinabush	Annual wild buckwheat	
Broom snakeweed	Catclaw mimosa	

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
   Albuquerque, NM
   MLRA 42

2. Field Offices
   Roswell
   Portales
   Lovington
   Artesia
   Alamogordo
   Carlsbad

3. Field Office Sample Location:
   Eddy County, New Mexico - center of S E 1/4, Section 29, T. 20 S., R. 30 E., NMPM. Approximately 17 miles northeast of Carlsbad, New Mexico. Map Sheet #84, Eddy Area Soil Survey, CP Mapping Unit - Cacique loamy sand.

4. Approved:

D. Sylvester 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place, depending upon the animals, upon plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect a plant's ecological place in the climax plant community.

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Primary: These species generally decrease when the climax plant community is subjected to continuous heavy grazing pressure by the animals listed. These species are normally grazed first and preferred by the designated grazing animals when given free choice.

Secondary: These plants usually increase initially, then decrease when the site is subjected to continuous heavy grazing use by the animals listed. These plants are normally grazed after primary plants become scarce under free choice, or along with them under intensive grazing systems.

Low Value: These plants continue to increase with heavy, continuous grazing use of the site. These plants are not normally grazed until primary and secondary species are gone and animals are forced to eat them.

For quail and dove, the terms also relate to use for cover and protection where it is obvious these birds do not eat the plant.

RANGE SITE DESCRIPTION

Section IIE, Technical Guide

A. SITE NO. D42-2-NTx Shallow Sandy Range Site (SD-3)

B. PHYSIOGRAPHIC FEATURES

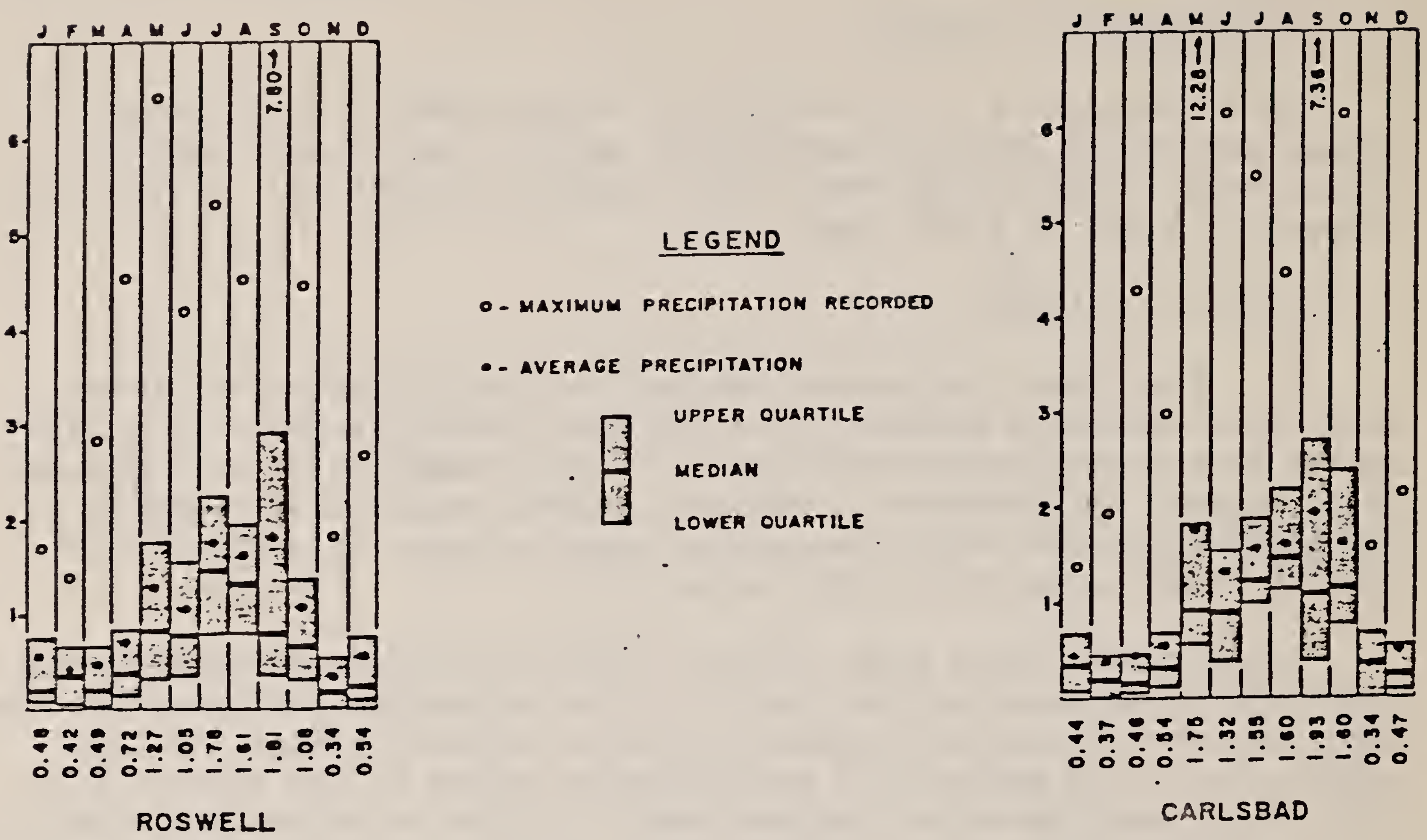
This site occurs on upland plains between desert drainageways. Slopes are nearly level to undulating, usually less than 9 percent. Direction of slope varies and is not usually significant. Elevations range from 3,200 to 4,500 feet.

C. CLIMATIC FEATURES

1. The frost-free season ranges from 190 to 225 days between early April and late October. The optimum growing season of the major native warm season plants coincides with the summer rains during June, July, August, and September. However, plants can make some growth at any time during the frost-free period when moisture is available and minimum daily temperatures stay above 51° F.

Vegetation on this site will be limited to plants which can take advantage of moisture at the time it falls, since the soil profiles have large amounts of available water for short periods of time and then rapidly dry. The majority of precipitation comes in the form of high intensity, short duration thunderstorms. Little or no available moisture can be stored in the soil profiles of this site. Strong winds from the southwest blow during January through June which accelerate soil drying within the plant root zone and further discourage cool-season plant growth or occupancy of the site.

2. Rainfall Dispersion



ROSWELL

CARLSBAD

RAINFALL DISPERSION DIAGRAMS:
SOUTHEAST

3. Temperature

Length of Record - 40 years, Roswell, New Mexico
January average - 39.8°
July average - 78.1°
Maximum - 110°
Minimum - -29°
Average dates of first killing frost - October 31
Average dates of last killing frost - April 7
Average growing season - 207 days

Length of Record - 40 years, Carlsbad, New Mexico
January average - 44.3°
July average - 80.5°
Maximum - 112°
Minimum - -17°
Average dates of first killing frost - November 4
Average dates of last killing frost - March 29
Average growing season - 220 days

D. SOILS

1. The soils are very shallow to shallow, less than 20 inches in depth. The surface layers are loamy fine sand and fine sandy loam overlying layers of loamy sand, fine sandy loam and some sandy clay loam. An indurated caliche layer occurs at depths of 6 to 20 inches and is at an average of 15 inches from the surface. The soils are well drained and have rapid, moderately rapid and some moderate permeability. Available water-holding capacity is low. The plant-soil-air-water relationship is good. The indurated caliche layer typically holds water up in the profile for short periods within the root zone and to the benefit of the shallow rooted plants. The soils, if unprotected by grass cover and organic residue, become wind blown, commonly causing low hummocks around shrubs.

2. Some soil taxonomic units are:
   Cruces loamy fine sand
   Jerag very fine sandy loam
   Philder fine sandy loam
   Sharvana loamy fine sand
   Sharvava fine sandy loam
   Simona fine sandy loam
   Simona loamy fine sand
   Tonuco loamy fine sand
   Upton gravelly loam (as mapped in Lea County, New Mexico)

E. POTENTIAL NATURAL PLANT COMMUNITY

1. The general aspect of this site is that of a grassland sparsely dotted with shrubs. Black grama is the dominant plant on the site. Some mid-grasses and perennial forbs also exist. During wet springs, many annual forbs are present and noticeable.

2. Composition of Potential Plant Community

Approximate percentage of total annual herbage production.

Grasses and Grasslike - 75-85%	
*Black grama	50-60
*Bush muhly	5-10
*Blue grama	5-10
*Sideoats grama	1-5
Mesa dropseed)	
*Sand dropseed)	5-10
Spike dropseed)	
*Threeawns spp.)	
Plains bristlegrass)	
*Arizona cottontop)	5-10
Hooded windmillgrass)	
Bristle panicum)	
Field sandbur)	
Fluffgrass)	1-5
False-buffalograss)	
Other annual grasses)	

(Shrubs, half shrubs, vines and trees) Woody - 3-7%	
*Common javelinabush)	1-3
Catclaw mimosa)	
*Small soapweed)	1-3
Engelmann pricklypear)	
*Mormon-tea)	
Range ratany)	1-3
*Feather dalea)	
Broom snakeweed)	

Forbs - 10-20%	
*Leatherweed croton)	
*Globemallow)	3-7
Verbena)	
Desertholly)	1-3
Cutleaf haplopappus)	
Senna)	1-5
Plains blackfoot)	
Halfshrub sundrop)	
Trailing fleabane)	1-5
Fiddleneck)	
Deerstongue)	
Wooly Indian-wheat)	3-5
Locoweed)	
Other annual forbs)	

* See Form SCS-SOILS-5 for individual soil series.

3. Ground Cover (Percent of Surface Area)

Grasses and forbs - plant density	33
Trees and shrubs - canopy	3
Bare ground	14
Surface gravel	6
Surface cobble and stones	0
Litter - percent of area	44
average depth in cm.	2

F. TOTAL ANNUAL HERBAGE PRODUCTION (Air-dry)

Favorable years	-	1,050 pounds per acre
Median years	-	900 pounds per acre
Unfavorable years	-	600 pounds per acre

G. SITE INTERPRETATIONS

1. Grazing

This site is suitable for grazing during all seasons of the year. It is well suited to grazing by all classes of cattle and horses. If protection from, or control of, predators can be provided, it is also well suited to grazing by sheep and goats.

2. Wood Products

The natural potential plant community of this site affords little or no wood products. Where the site has been invaded by mesquite or cholla cactus the roots and stems of these plants provide attractive material for a variety of curiositites, such as lamps and small furniture.

3. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, spotted ground squirrel, Ord's kangaroo rat, Northern grasshopper mouse, coyote, horned lark, meadowlark, lark bunting, scaled quail, side-blotched lizard, round-tailed horned lizard, marbled whiptail, prairie rattlesnake and ornate box turtle.

The marsh hawk hunts over this site in winter.

Common javalinabush and catclaw mimosa provide protective cover for scaled quail. Seed and green herbage from a variety of grasses and forbs provide food for a number of birds and small mammals.

4. Hydrological Interpretations

Soil Series	Hydrologic Group
Cruces	D
Jerag	D
Philder	D
Sharvana	C
Simona	D
Tonuco	C
Upton	C

Approximate hydrologic curve number when the hydrologic cover is optimum: C Soils - 76; D Soils - 86.

5. Recreation and Natural Beauty

This site offers recreation potential for hiking, horseback riding, nature observation and photography, and quail and dove hunting. During years of abundant spring moisture, this site displays a riot of color from wildflowers during May and June. A few summer and fall flowers also occur.

6. Endangered Plants and Animals

Presently, there are no known endangered plants which are a part of the potential vegetation or endangered animals which are indigenous to this site. As these become known, they will be added to this section.

H. OTHER PERTINENT INFORMATION

1. Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Range Condition	Ac/Aum
Excellent (100-76)	2.5-3.5
Good (75-51)	3.2-4.6
Fair (50-26)	4.5-7.5
Poor (25-0)	7.6 +

2. Relative Quality of Plants for Animal Use 1/

(a) Cattle

Primary
Black grama
Bush muhly
Blue grama
Sideoats grama
Plains bristlegrass
Arizona cottontop
Verbena
Mormon-tea
Range ratany

Secondary
Sand dropseed
Spike dropseed
Mesa dropseed
Hooded windmillgrass
Bristle panicum
Other annual grasses
Globemallow
Senna
Plains blackfoot
Half-shrub sundrop
Trailing fleabane
Wooly Indian-wheat
Other annual forbs
Small soapweed
Engelmann pricklypear

Low Value
Threeawns spp.
Field sandbur
Fluffgrass
False-buffalograss
Leatherweed crot[illegible]
Desertholly
Cutleaf happlopappus
Fiddleneck
Deerstongue
Locoweed
Common javelinabush
Catclaw mimosa
Feather dalea
Broom snakeweed

(b) Sheep

Primary
Leatherweed croton
Globemallow
Verbena
Plains blackfoot
Trailing fleabane
Wooly Indian-wheat
Black grama
Bush muhly
Blue grama
Sideoats grama
Plains bristlegrass

Secondary
Senna
Half-shrub sundrop
Other annual forbs
Mesa dropseed
Sand dropseed
Spike dropseed
Arizona cottontop
Hooded windmillgrass
Bristle panicum
Other annual grasses
Engelmann pricklypear
Mormon-tea
Range ratany

Low Value
Desertholly
Cutleaf happlopappus
Fiddleneck
Deerstongue
Locoweed
Threeawns spp.
Field sandbur
Fluffgrass
False-buffalograss
Common javelinabush
Catclaw mimosa
Small soapweed
Feather dalea
Broom snakeweed

(c) Goats

Primary
Mormon-tea
Range ratany
Leatherweed croton
Verbena
Trailing fleabane
Wooly Indian-wheat
Other shrubs

Secondary
Catclaw mimosa
Small soapweed
Engelmann pricklypear
Feather dalea
Broom snakeweed
Other annual grasses
Other perennial grasses
Senna
Other perennial forbs
Other annual forbs

Low Value
Common javelinabush
Threeawns spp.
Field sandbur
Fluffgrass
False-buffalograss
Desertholly
Locoweed

(d) Antelope

Primary
Leatherweed croton
Half-shrub sundrop
Globemallow
Verbena
Plains blackfoot
Locoweed
Plains bristlegrass
Sideoats grama
Feather dalea
Range ratany
Mormon-tea
Other perennial forbs
Other annual forbs

Secondary
Cutleaf happlopappus
Senna
Trailing fleabane
Deerstongue
Wooly Indian-wheat
Black grama
Blue grama
Fluffgrass
Bristle panicum
Arizona cottontop
Sand dropseed
Mesa dropseed
Spike dropseed

Low Value
False-buffalograss
Field sandbur
Engelmann pricklypear
Small soapweed
Common javelinabush
Catclaw mimosa
Other shrubs

(e) Quail

Primary
Range ratany
Other annual forbs
Plains bristlegrass
Senna
Leatherweed croton
Bush muhly
Bristle panicum
Common javelinabush
Catclaw mimosa
Plains blackfoot
Broom snakeweed

Secondary
Arizona cottontop
Sideoats grama
Feather dalea
Sand dropseed
Mesa dropseed
Spike dropseed
Cutleaf happlopappus
Wooly Indian-wheat

Low Value
Field sandbur
False-buffalograss
Small soapweed
Other annual grasses
Blue grama
Engelmann pricklypear
Black grama

(f) Dove

Primary
Leatherweed croton
Globemallow
Senna
Plains blackfoot
Other annual forbs
Other perennial forbs
Range ratany
Plains bristlegrass

Secondary
Verbena
Cutleaf happlopappus
Wooly Indian-wheat
Catclaw mimosa
Broom snakeweed
Bristle panicum
Arizona cottontop
Fluffgrass
Other perennial grasses
Other annual grasses

Low Value
Trailing fleabane
Common javelinabush
Small soapweed
Black grama
Blue grama
Sideoats grama
False-buffalograss
Other shrubs

I. IDENTIFICATION AND AUTHORIZATION

1. USDA, SCS
Albuquerque, NM
MLRA 42

2. Field Offices:

New Mexico
Roswell
Artesia
Portales
Lovington
Carlsbad
Alamogordo

Texas
Dell City

3. Field Office Sample Location

   Lea County, New Mexico - SE 1/4 of NE 1/4 Section 2, T. 24 S., R. 35 E., NMPM Woolsworth Estate Ranch (John Post, lessee) Simona fine sandy loam. M.U. SW Soil Survey Sheet #151 Lea Soil Survey

4. Approved:

D. Sylvester 11/3/77
State Range Conservationist Date

Regional Range Conservationist Date

Legend and Definitions for Range Site Descriptions.

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OFFICIAL SOIL SERIES
DESCRIPTIONS AND INTERPRETATIONS

SOIL SERIES FILE

Established Series
Rev. ERB
9/73

AMARILLO SERIES

The Amarillo series is a member of the fine-loamy, mixed, thermic family of Aridic Paleustalfs. These soils have brown sandy loam A horizons and yellowish red sandy clay loam Bt horizons that extend to depths of 60 or more inches and have a layer of calcium carbonate accumulation at about 3 feet.

Typifying Pedon: Amarillo fine sandy loam - grassland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-11" -- Brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; hard, very friable; many fine roots; many fine and medium pores; many worm casts; mildly alkaline; clear smooth boundary. (5 to 19 inches thick)

B21t -- 11-27" -- Reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse prismatic structure parting to weak medium subangular blocky structure; very hard, friable; many fine and medium pores; thin patchy clay films on faces of prisms; clay bridged sand grains throughout; common worm casts; mildly alkaline; gradual wavy boundary. (10 to 25 inches thick)

B22t -- 27-38" -- Yellowish red (5YR 4/6) sandy clay loam, moist; weak medium subangular blocky structure; hard, friable; clay bridged sand grains; common films and threads of $CaCO_3$ on faces of peds; interiors of peds noncalcareous; moderately alkaline; gradual wavy boundary. (10 to 30 inches thick)

B23tca -- 38-56" -- Pink (5YR 7/3) sandy clay loam, light reddish brown (5YR 6/3) moist; weak medium subangular blocky structure; hard, friable; estimated 60 percent $CaCO_3$ equivalent, 30 percent by volume is concretions of $CaCO_3$ less than 1 inch in diameter; calcareous, moderately alkaline; gradual wavy boundary. (6 to 36 inches thick)

B24t -- 56-85" -- Yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak very coarse prismatic structure parting to weak medium subangular blocky structure; slightly hard, friable; thin patchy clay films and clay bridging of sand grains; few, mostly vertical stringers of soft bodies of $CaCO_3$ are concentrated along faces of prisms; few $CaCO_3$ concretions less than 1 inch in diameter; calcareous, moderately alkaline; gradual wavy boundary. (25 to 50 inches thick)

B25t -- 85-99" -- Light reddish brown (5YR 5/4) sandy clay loam, yellowish red (5YR 4/5) moist; weak very coarse prismatic structure parting to weak medium subangular blocky structure; hard, friable; thin patchy clay films and bridged sand grains; few soft bodies of $CaCO_3$ are concentrated in vertical columns along faces of prisms; calcareous, moderately alkaline.

Type Location: Lamb County, Texas; 0.9 mile northwest of Sudan on U. S. Highway 84, then 1.1 miles north on county unpaved road and 200 feet west in rangeland.

Range in Characteristics: Thickness of the solum ranges from 60 to more than 80 inches. Secondary carbonates are at depths of 18 to 40 inches. Depth to the calcic horizon is 30 to 60 inches. Color of the A horizon is light reddish brown (5YR 6/3, 6/4), light brown (7.5YR 6/4), reddish brown (5YR 5/3, 5/4), or brown (7.5YR 5/2, 5/4, 4/4). It is fine sandy loam or loamy fine sand. Reaction is neutral to mildly alkaline. The B21t and B22t horizons are reddish brown (5YR 5/3, 4/3; 5/4, 4/4), brown (7.5YR 5/4, 4/4), reddish yellow (5YR 6/6), or yellowish red (5YR 5/6, 4/6). Texture is sandy clay loam or clay loam. Reaction is mildly alkaline to moderately alkaline. The Btca horizon is pink (5YR 7/3, 7/4, 8/4; 7.5YR 7/4), light reddish brown (5YR 6/3, 6/4), light brown (7.5YR 6/4), or reddish yellow (5YR 7/6, 6/6; 7.5YR 7/6, 6/6). It is clay loam or sandy clay loam. Calcium carbonate content is 20 to 60 percent, in soft powdery masses and concretions. The Bt horizons below the calcic horizon are red,

USDA-SCS-FORT WORTH, TEX. 1974

ish brown, reddish yellow, or yellowish red in hues 2.5YR and 5YR. Texture ranges from clay loam to sandy clay loam. Carbonates in the lower Bt horizons vary from coatings on ped faces to vertical stringers of cemented nodules or concretions that make up 1 to 10 percent of the soil.

Competing Series and their Differentiae: These are the Acuff, Brennan, Brownfield, Canel, Cobb, Dalhart, Faskin, Grandfield, May, Menard, Miles, Patricia, Posey, and Springer series. Acuff soils have mollic epipedons. Brennan soils have mean annual temperature of more than 72° F. Brownfield, Grandfield, Menard, Miles, and Patricia soils lack calcic horizons within 60 inches. Brownfield soils also have an arenic epipedon. Cobb soils have sandstone within depths of 40 inches. Dalhart soils have mean annual soil temperature of less than 59° F. Faskin and Canel soils are dry for longer periods of the time that the temperature exceeds 41° F. May soils are dominantly of 10YR hue and lack secondary carbonates within depths of 28 inches. Posey soils are calcareous throughout and have calcic horizons within 30 inches. Springer soils have less than 18 percent clay in the Bt horizon and are dry for shorter periods.

Setting: Amarillo soils are on uplands. Slope gradients range from 0.5 percent to 5 percent. The soil formed in old eolian deposits or alluvium. Average annual precipitation ranges from 17 to 22 inches, the Thornthwaite annual P-E indices from 22 to 34, and the mean annual temperature from 57° to 66° F.

Principal Associated Soils: These are the competing Acuff, Brownfield, Olton, Patricia, and Posey soils and the Arvana, Midessa, and Portales soils. Arvana soils have petrocalcic horizons. Midessa and Portales soils lack argillic horizons, and Portales soils, in addition, have mollic epipedons.

Drainage and Permeability: Well drained; slow to medium runoff; moderate permeability.

Use and Vegetation: Mainly cultivated; cotton and grain sorghum are the principal crops. Native vegetation on the loamy fine sands is sideoats grama, bluestems, and switchgrass, that on the fine sandy loam is sideoats grama, blue grama, buffalograss and Arizona cottontop. Woody plants are mesquite, lotebush, catclaw, and sand sagebrush.

Distribution and Extent: Western Texas and eastern New Mexico south of the Canadian River. The series is extensive.

Series Established: Randall County, Texas. (Reconnaissance Soil Survey of Panhandle Region of Texas); 1910.

Remarks: The Amarillo soils were formerly classified in the Reddish Chestnut great soil group.

Additional Data: Beltsville Laboratory Data for 2 pedons; Samples No. 531002-531008; 53985-53990. Geo. Kunze data for 3 pedons - Texas A&M University. Data also available in Texas A&M Experiment Station Bulletin MP-559 "Soils of the Big Spring Field Station" and ARS Publication 41-85 "Some Morphological, Physical, Chemical, and Mineralogical Properties of Seven Southern Great Plains soils".

National Cooperative Soil Survey
U. S. A.

TX0130

SOIL SURVEY INTERPRETATIONS

AMARILLO [illegible]

MLPA(S): 77, 78
ERB, 9-73
ARIDIC PALEUSTALFS, FINE-LOAMY, MIXED, THERMIC

THE AMARILLO SERIES CONSISTS OF DEEP, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN LOAMY, CALCAREOUS, ALLUVIAL OR EOLIAN MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 11 INCHES THICK. THE SUBSOIL IS SANDY CLAY LOAM TO DEPTHS OF MORE THAN 99 INCHES. IT IS REDDISH BROWN IN THE UPPER 16 INCHES, YELLOWISH RED IN THE NEXT 11 INCHES, PINK WITH 60 PERCENT CALCIUM CARBONATE IN THE NEXT 29 INCHES, AND LIGHT REDDISH BROWN BELOW 55 INCHES. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-11	FSL	SM, SM-SC, CL-ML	A-2-4, A-4	0	100	100	95-100	35-55	17-25	2-7
0-11	LFS	SM, SM-SC	A-2-4	0	100	100	95-100	15-35	<22	NP-4
11-38	SCL, CL	SC, SM-SC, CL	A-4, A-6, A-2-4	0	100	100	95-100	35-65	20-40	7-20
38-80	SCL, CL	SC, CL, SM-SC	A-4, A-6, A-2-4	0	90-100	90-100	65-98	35-70	20-35	7-17

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-11	2.0-6.0	0.11-0.15	6.6-7.8	-	LOW	LOW	LOW	.24	5	3
0-11	2.0-6.0	0.06-0.10	6.6-7.8	-	VERY LOW	LOW	LOW	.15	5	2
11-38	0.6-2.0	0.14-0.18	7.4-8.4	-	LOW	MODERATE	LOW	.32		
38-80	0.6-2.0	0.10-0.15	7.9-8.4	-	LOW	MODERATE	LOW	.32		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE			>6			-		>60		-		B	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

COMMUNITY DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (E)

ROADFILL	MODERATE-LOW STRENGTH
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	FSL: FAIR-THIN LAYER LFS: POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-SEEPAGE,PIPING
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	FSL: ERODES EASILY LFS: ERODES EASILY,TOO SANDY
TERRACES AND DIVERSIONS	FSL: FAVORABLE LFS: TOO SANDY
GRASSED WATERWAYS	FAVORABLE

AMARILLO SERIES

RECREATION (C)

CAMP AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY	PLAYGROUNDS	0-2% FSL: SLIGHT 2-5% FSL: MODERATE-SLOPE 0-2% LFS: MODERATE-TOO SANDY 2-5% LFS: MODERATE-TOO SANDY,SLOPE
PICNIC AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY	PATHS AND TRAILS	FSL: SLIGHT LFS: MODERATE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		WHEAT (BU)		SOYBEANS (BU)							
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1% FSL	3E	2E	250	1000	25	110	15	50	-	45						
1-3% FSL	3E	3E	200	850	20	100	12	45	-	40						
3-5% FSL	4E	4E	175	650	15	75	10	40	-	-						
0-3% LFS	4E	3E	225	850	20	100	12	40	-	-						
3-5% LFS	6E	6E	-	-	-	-	-	-	-	-						

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDEX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	SIBERIAN ELM	35	GREEN ASH	20	HONEYLOCUST	30	OSAGE-ORANGE	20
	RUSSIAN-OLIVE	15	EASTERN REDCEDAR	15	ORIENTAL ARBORVITAE	20	ARIZONA CYPRESS	20

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
FSL	FAIR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR
LFS	POOR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (E)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: SANDY LOAM	LOAMY SAND			
SIDEOATS GRAMA	BOCU	15	15			
BLUE GRAMA	BOGR2	30	5			
BUFFALOGRASS	BUCA	10	-			
ARIZONA COTTONTOP	TRCA2	10	-			
PLAINS BRISTLEGRASS	SEMA5	5	5			
LITTLE BLUESTEM	ANSC2	5	30			
SAND DROPSEED	SPCR	5	5			
SAND BLUESTEM	ANHA	-	5			
SAND LOVEGRASS	ERTR3	-	5			
HAIRY GRAMA	BOHI2	-	5			
OTHER PERENNIAL GRASSES	PPGG	5	10			
OTHER ANNUAL FORBS	AAFF	5	-			
OTHER PERENNIAL FORBS	PPFF	5	5			
OTHER SHRUBS	SSSS	5	10			
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		2800	2800			
NORMAL YEARS		2100	2000			
UNFAVORABLE YEARS		1400	1200			

FOOTNOTES

A RATINGS BASED ON ENGINEERING TEST DATA OF 9 PEDONS FROM LAMB AND TERRY COUNTIES, TEXAS
B RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS", NOV. 1971
C RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968
D WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
SL-SANDY LOAM RANGE SITE; LFS-LOAMY SAND RANGE SITE
ATINGS BASED ON SRWPC COMMITTEE IV GUIDE, DRAFT APR. 1970

Established Series
Rev. WJR/VGL
11/72

ARCH SERIES

The Arch series is a member of the fine-loamy, mixed, thermic family of Ustochreptic Calciorthids. Typically, Arch soils have brown calcareous fine sandy loam A horizons, pale brown calcareous fine sandy loam AC horizons and white very calcareous clay loam Cca horizons at a depth of 17 inches.

Typifying Pedon: Arch fine sandy loam - rangeland
(Colors are for dry soils unless otherwise noted.)

A1 0-10"--Brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure in the upper 3 inches and weak fine and medium subangular blocky structure in lower part; soft, very friable, nonsticky; many fine and very fine roots; many fine and very fine pores; calcareous; moderately alkaline; clear smooth boundary. (3 to 12 inches thick)

AC 10-17"--Pale brown (10YR 6/3) light sandy clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky; common very fine and fine roots; many very fine and fine pores; few white (10YR 8/1) filaments, threads and ped coatings of segregated lime; calcareous; moderately alkaline; clear wavy boundary. (7 to 12 inches thick)

C1ca 17-39"--White (10YR 8/1) clay loam, light gray (10YR 7/1) moist; massive; hard, friable, sticky; few very fine roots; common very fine pores; many medium to coarse lime bodies somewhat harder and slightly whiter in color than the matrix; strongly calcareous; strongly alkaline; diffuse wavy boundary. (15 to 30 inches thick)

C2ca 39-60"--Light gray (10YR 7/2) light clay loam, pale brown (10YR 6/3) moist; massive; hard, friable, slightly sticky; many very fine and fine pores; few soft to slightly hard white (10YR 8/1) lime bodies well dispersed through matrix; strongly calcareous; moderately alkaline.

Type Location: Roosevelt County, New Mexico; SE1/4NW1/4SW1/4, sec. 3, T.1S., R.35E.

Range in Characteristics: The depth to the upper boundary of the layer containing the maximum lime accumulation ranges from 10 to 20 inches. Mean annual soil temperatures range from 59° to 72°F. The 10-to 40-inch control section averages 15 to 40 percent calcium carbonate equivalent and has common to many fine to coarse, hard to extremely hard irregular to rounded nodules. The A1 horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. It contains 0.7 to 1.2 percent organic matter. This horizon has weak thin platy and weak fine granular structure in the upper few inches and weak fine to medium subangular blocky structure in the lower part. The AC horizon has hue of 2.5Y or 10YR, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 or 3. It ranges from heavy sandy loam and light clay loam to loam. This horizon has few to common fine lime filaments, threads and powdery ped coatings to common fine soft lime bodies and hard nodules. The C1ca horizon has hue of 2.5Y or 10YR, value of 7 or 8 dry, 6 or 7 moist, and chroma of 0 through 2. It ranges from sandy clay loam to loam and light clay loam with clay content between 18 and 35 percent of which 1/3 or more is carbonate clay. The upper 1 to 3mm. of the C1ca horizon are weakly to strongly cemented with silica. The C2ca horizon has hue of 7.5YR through 2.5Y, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. It ranges from sandy loam to clay loam. This horizon has distinctly less calcium carbonate than the C1ca horizon.

Competing Series and their Differentiae: Alama, Alicia, Dean, Gomez, Jal, La Fonda, La Lande, Quay, Reagan, Reeves, San Jon, Veal, Willard, and Wink series. Alama, Alicia, and La Fonda soils lack calcic horizons. Dean and Willard soils have average annual soil temperatures between 47° and 59°F. Gomez and Wink soils contain less than 18 percent total clay in the control section. Jal, Reeves, and Wink soils are dry in all parts of the moisture control section more than 3/4 of the time (cumulative) the soil temperature exceeds 41°F. Also, Reeves soils have mineralogy in the control section dominated by gypsum. Quay soils have control sections in which silicate clay constitutes 2/3 or more of the clay size fraction and have hue of 2.5YR or 5YR. Reagan soils have calcic horizons with the upper boundary at depths of 20 to 40 inches.

Setting: The Arch soils are on level to gently sloping old piedmont plains and benchlands and valley plains. The soils formed in moderately coarse to medium textured sediments with moderate to high carbonate content. The climate is semiarid continental. The mean annual precipitation ranges from 12 to about 18 inches of which 70 percent comes between May and September and is characterized by usually brief heavy thunderstorms. The mean annual temperature near the type location is about 57°F.

Principal Associated Soils: These are the competing Quay soils and the Kimbrough, Mansker, and Portales soils. Kimbrough, Mansker, and Portales soils have mollic epipedons.

Drainage and Permeability: Well-drained; slow runoff; moderate permeability.

Use and Vegetation: The principal use is for rangeland but where water is available, this soil is irrigated to cultivated crops. Native vegetation is mainly buffalo grass, blue grama, alkali sacaton, and sideoats grama. Scattered yucca and cholla cactus also occur.

Distribution and Extent: Eastern New Mexico and southern high plains area of Texas. It is of moderate extent.

Series Established: Roosevelt County, New Mexico, 1940.

National Cooperative Soil Survey
U. S. A.

SOIL SURVEY INTERPRETATIONS

ARCH SERIES

MLRA(S): 77
MVH, 8-74
USTOCHREPTIC CALCIORTHIDS, FINE-LOAMY, MIXED, THERMIC

THE ARCH SERIES CONSIST OF DEEP WELL-DRAINED SOILS FORMED IN MODERATELY COARSE AND MEDIUM TEXTURED SEDIMENTS HIGH IN LIME ON PLAINS. SLOPES ARE 0 TO 5 PERCENT. ELEVATION IS 3600 TO 4000 FT. MEAN ANNUAL PRECIPITATION IS 12 TO 18 IN. MAAT IS 57 TO 60 F. FROST-FREE SEASON IS 195 TO 205 DAYS. IN A REPRESENTATIVE PROFILE THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 10 IN. THICK. THE SUBSOIL IS PALE BROWN LIGHT SANDY CLAY LOAM ABOUT 7 INCHES THICK. THE SUBSTRATUM IS WHITE AND LIGHT GRAY CLAY LOAM AND LIGHT CLAY LOAM TO 60 INCHES OR MORE.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-10	L, VFSL	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
0-10	LFS	SM	A-2	0	100	100	90-100	20-30	-	NP
0-10	FSL	SM, ML	A-4	0	100	100	85-95	40-60	<30	NP-5
10-17	L, CL, SCL	CL, CL-ML	A-6, A-4	0	100	100	85-95	50-65	25-35	5-15
17-60	L, CL	CL	A-6	0	100	100	90-100	70-80	30-40	10-20

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-10	0.6-2.0	0.15-0.17	7.9-8.4	<2	LOW	HIGH	LOW	.28	5	4L
0-10	2.0-6.0	0.08-0.10	7.4-8.4	<2	LOW	HIGH	LOW	.17	5	2
0-10	2.0-6.0	0.13-0.15	7.4-8.4	<2	LOW	HIGH	LOW	.32	5	3
10-17	0.6-2.0	0.16-0.19	7.9-8.4	2-4	MODERATE	HIGH	LOW	.37		
17-60	0.6-2.0	0.15-0.17	7.9-9.0	2-4	MODERATE	HIGH	LOW	.37		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2+%: MODERATE-SEEPAGE, SLOPE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

SOURCE MATERIAL

ROADFILL	FAIR-LOW STRENGTH, SHRINK-SWELL
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	LFS: POOR-TOO SANDY, EXCESS LIME L, FSL: POOR-EXCESS LIME

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	MODERATE-SHRINK-SWELL
DWELLINGS WITH BASEMENTS	MODERATE-SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	MODERATE-SHRINK-SWELL
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

WATER MANAGEMENT

POND RESERVOIR AREA	SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SHRINK-SWELL, LOW STRENGTH
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	PERCS SLOWLY
IRRIGATION	ERODES EASILY, SOIL BLOWING, EXCESS LIME
TERRACES AND DIVERSIONS	ERODES EASILY
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATION

CAMP AREAS	LFS: MODERATE-TDO SANDY, SOIL BLOWING L, FSL: MODERATE-DUSTY	PLAYGROUNDS	0-2% LFS: MODERATE-TOO SANDY, SDIL BLOWING 0-2% L, FSL: MODERATE-OUSTY 2+% L, FSL: MODERATE-SLOPE, DUSTY 2+% LFS: MODERATE-SLOPE, TOO SANDY, SDIL BLOWING
PICNIC AREAS	LFS: MODERATE-TDO SANDY, SOIL BLOWING L, FSL: MODERATE-DUSTY	PATHS AND TRAILS	LFS: MDDERATE-TOO SANDY, SOIL BLOWING L, FSL: MDDERATE-OUSTY

CAPABILITY AND PREOICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT) (A)

CLASS-OETERMINING PHASE	CAPA-BILITY		ALFALFA HAY (TONS)		CDTTON LINT (LBS)		GRAIN SORGHUM (BU)		PEANUTS (LBS)		SWEET PDTATDES (BU)					
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
L, VFSL, LFS	6E	4E	-	4	-	500	-	45	-	1600	-	500				
EROOEO	6E	-	-	-	-	-	-	-	-	-	-	-				

WOODLAND SUITABILITY

CLASS-OETERMINING PHASE	ORO SYM	MANAGEMENT PROBLEMS: EROSIDN HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINOTH. HAZARO	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INOX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-OETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NDNE							

WILDLIFE HABITAT SUITABILITY (B)

CLASS-OETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HAROWD TREES	CDNIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLO WILDLF	WDODLD WILOLF	WETLAND WILOLF	RANGELO WILOLF
NIRR	POOR	FAIR	FAIR	-	-	FAIR	V. PDOR	V. POOR	FAIR	-	V. POOR	FAIR
0-1% IRR	FAIR	GODD	GOOD	-	-	GOOD	FAIR	GDDD	FAIR	-	FAIR	-
I-3% IRR	FAIR	GOOD	GOOD	-	-	GOOD	PDOR	FAIR	FAIR	-	POOR	-
3+% IRR	FAIR	GDOO	GOOD	-	-	GOOD	PODR	V. PODR	FAIR	-	V. PODR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNOERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITIDN (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
ALKALI SACATON	SPAI	25				
SIDEDATS GRAMA	BDCU	10				
BLACK GRAMA	BOER4	15				
BLUE GRAMA	BOGR2	10				
HAIRY GRAMA	BDHI2	7				
THREEAWN	ARIST	5				
SAND DRDPSEED	SPCR	5				
SMALL SDAPWEED	YUGL	2				
SOAPTREE YUCCA	YUEL	1				
NEVAOA MDRMONTEA	EPNE	5				
DDTTED GAYFEATHER	LIPU	3				
ROCKYMDUNTAIN ZINNIA	ZIGR	2				
PAPERFLOWER	PSIL03	2				
FOURWING SALTBUSH	ATCA2	5				
WINTERFAT	EULA5	3				
POTENTIAL PRDDUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1150				
NDRMAL YEARS		900				
UNFAVORABLE YEARS		700				

FDDTNOTES

A ONLY SPRINKLER IRRIGATION WAS CONSIDERED LAND LEVELING CUTS ARE LIMITED ON SLOPES 72% FDR FURRDW IRRIGATION.

B MDISTURE REGIME WAS OISREGARDED WHEN RATING FOR WILD HERBACEDUS PLANTS AND SHRUBS WHEN IRRIGATEO.

SOIL SERIES FILE

Established Series
Rev. ERB
10/73

ARVANA SERIES

The Arvana series is a member of the fine-loamy, mixed, thermic family of Petrocalcic Paleustalfs. Arvana soils have brown fine sandy loam A horizons containing less than 1 percent of organic matter, and Bt horizons of reddish brown and yellowish red sandy clay loam that are underlain at about 28 inches by indurated caliche.

Typfifying Pedon: Arvana fine sandy loam - cropland.
(Colors are for dry soil unless otherwise stated.)

Ap -- 0-8" -- Brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, very friable; many roots; many pores; few worm casts; noncalcareous, moderately alkaline; abrupt smooth boundary. (4 to 12 inches thick)

B21t -- 8-16" -- Reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse prismatic structure, parting to weak subangular blocky structure; very hard, friable, sticky; many fine pores; few worm casts; thin patchy clay films on peds; noncalcareous, moderately alkaline; gradual smooth boundary. (6 to 12 inches thick)

B22t -- 16-24" -- Reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure, parting to weak subangular blocky structure; very hard, friable, sticky; few fine pores; few worm casts; thin patchy clay films; noncalcareous, moderately alkaline; clear wavy boundary. (6 to 12 inches thick)

B23t -- 24-28" -- Yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable, sticky; few fine pores; few worm casts; few fine films and threads of $CaCO_3$; thin patchy clay films; moderately alkaline; abrupt wavy boundary. (0 to 6 inches thick)

B24cam -- 28-38" -- Pinkish white (5YR 8/2) indurated caliche, laminar in the upper 1/2 inch, few reddish bodies up to 1/2 inch in size. (4 to 24 inches thick)

B25ca -- 38-60" -- Pink (5YR 8/3) loam, pink (5YR 7/4) moist; few reddish yellow (5YR 6/6) splotches; weak fine and medium subangular blocky structure; hard, friable; about 70 percent $CaCO_3$; few worm casts and large pores; moderately alkaline; diffuse wavy boundary. (12 to 36 inches thick)

B26tca -- 60-80" -- Reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; hard, friable; about 30 percent $CaCO_3$ in soft powdery bodies; patchy clay films on ped surfaces; common fine pores; few worm casts; moderately alkaline.

Type Location: Hockley County, Texas; 3 miles south and 2 miles west of Pep; 1,500 feet south and 30 feet east of the northwest corner of labor 16, league 702.

Range in Characteristics: Thickness of the solum or depth to the B2cam horizon ranges from 20 to 40 inches. Color of the A horizon is light reddish brown (5YR 6/3, 6/4), light brown (7.5YR 6/4), reddish brown (5YR 4/3, 4/4, 5/3, 5/4), or brown (7.5YR 4/2, 4/4, 5/2, 5/4). It is fine sandy loam or loam. Structure of the A horizon in noncultivated pedons is weak prismatic parting to weak granular or weak subangular blocky. It is neutral through moderately alkaline in reaction and noncalcareous. The Bt horizon ranges from reddish brown to red; hues are 5YR and 2.5YR. It is fine sandy loam to sandy clay loam; clay content is 18 to 35 percent. Structure of the Bt horizon is compound moderate medium to coarse prismatic parting to weak subangular blocky structure. It is neutral through moderately alkaline. The B2cam horizon is dominantly 6 to 12 inches thick, but ranges up to 2 feet in some pedons. It is indurated to strongly cemented. The B2ca horizon is loam, clay loam, or sandy clay loam, and calcium carbonate content is 40 to 80 percent. The B2tca horizon is red, reddish brown, brown, reddish yellow, or yellowish red in hues 2.5YR through 7.5YR. It is clay loam or sandy clay loam.

Competing Series and their Differentiae: These are the Amarillo, Delmita, Douro, Faskin, Friona, Lea, Sharvana, Slaughter, and Stegall series. Amarillo and Faskin soils lack indurated caliche within depths of 40 inches. Delmita soils have average annual soil temperatures of 71.6° F., or higher. Douro soils are dry for longer periods of time. Friona, Lea, Slaughter, and Stegall soils have an A horizon at least 1/3 the thickness of the solum, or 10 inches, that contains 1 percent or more of organic matter. In addition, Slaughter and Stegall soils have 35 percent or more clay in the Bt horizon, and Lea soils lack a Bt horizon. Sharvana soils have the indurated caliche within depths of 20 inches.

Setting: Arvana soils are on nearly level plains. Slopes are generally less than 1 percent, but range to 3 percent near natural drainageways. The soil formed in old eolian deposits or alluvium which have thick accumulations of calcium carbonate in the mid and lower B horizon. The climate is semiarid; average annual precipitation is 16 to 22 inches, Thornthwaite annual P-E indices are 19 to 32, and mean annual temperature is 57° to about 70° F.

Principal Associated Soils: These are the Amarillo, Lea, Sharvana, and Slaughter soils of the competing series and the Kimbrough, Mansker, and Portales soils. Kimbrough soils lack Bt horizons, and are shallower over the indurated caliche. Mansker and Portales soils lack indurated caliche and are calcareous to the surface.

Drainage and Permeability: Well drained; slow to moderate runoff; moderate permeability.

Use and Vegetation: About half of the soil is cultivated and some is irrigated. Cotton and grain sorghums are the main crops. The native vegetation consists of grama grasses and some buffalograss, and low widely separated mesquite trees.

Distribution and Extent: The High Plains of Texas, and adjoining areas of New Mexico. The soil is extensive; estimated 200,000 acres.

Series Established: Andrews County, Texas; 1941.

Remarks: The Arvana soils were formerly classified in the Reddish Chestnut great soil group.

National Cooperative Soil Survey
U. S. A.

SOIL SURVEY INTERPRETATIONS

MLRA(S): 77
ERB, 10-73
PETROCALCIC PALEUSTALFS, FINE-LOAMY, MIXED, THERMIC

ARVANA SERIES

THE ARVANA SERIES CONSISTS OF MODERATELY DEEP, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN CALCAREOUS LOAMY MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 8 INCHES THICK. THE SANDY CLAY LOAM SUBSOIL EXTENDS TO A DEPTH OF 28 INCHES. THE SUBSOIL IS REDDISH BROWN IN THE UPPER 16 INCHES AND YELLOWISH RED BELOW 24 INCHES. THE SUBSTRATUM IS LOAMY CALICHE MATERIALS THAT ARE INDURATED IN THE UPPER 10 INCHES. SLOPES RANGE FROM 0 TO 3 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	FSL, L	SM, SM-SC	A-2-4, A-4	0	100	100	75-95	30-50	17-25	2-7
8-28	SCL	SC, CL, CL-ML, SM-SC	A-4, A-6	0	100	100	80-98	36-65	20-35	5-18
28-38	IND, VAR									

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-8	2.0-6.0	0.11-0.15	6.6-8.4	-	LOW	LOW	LOW	.24	2	3
8-28	0.6-2.0	0.12-0.18	7.4-8.4	-	LOW	MODERATE	LOW	.32		
28-38										

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE		>6				20-40	RIPPABLE	>60		-		C	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	SEVERE-CEMENTED PAN
SEWAGE LAGOON AREAS	SEVERE-CEMENTED PAN
SANITARY LANDFILL (TRENCH)	SEVERE-CEMENTED PAN
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-THIN LAYER

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	SEVERE-CEMENTED PAN
DWELLINGS WITHOUT BASEMENTS	MODERATE-CEMENTED PAN
DWELLINGS WITH BASEMENTS	SEVERE-CEMENTED PAN
SMALL COMMERCIAL BUILDINGS	SEVERE-CEMENTED PAN
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (A)

ROADFILL	POOR-THIN LAYER
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-THIN LAYER,TOO CLAYEY

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-CEMENTED PAN
EMBANKMENTS DIKES AND LEVEES	MODERATE-THIN LAYER
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ERODES EASILY,ROOTING DEPTH
TERRACES AND DIVERSIONS	CEMENTED PAN,ROOTING DEPTH
GRASSED WATERWAYS	ROOTING DEPTH

RECREATION (B)

CAMP AREAS	SLIGHT	PLAYGROUNDS	0-2%: SLIGHT 2-3%: MODERATE-SLOPE,DEPTH TO ROCK
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		WHEAT (BU)									
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1%	3E	2E	200	850	25	100	15	50								
1-3%	3E	3E	175	700	20	85	12	45								

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	FAIR	FAIR	FAIR	–	V. POOR	FAIR	V. POOR	V. POOR	FAIR	–	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		SANDY LOAM				
SIDEOATS GRAMA	BOCU	15				
BLUE GRAMA	BOGR2	30				
BUFFALOGRASS	BUDA	10				
ARIZONA COTTONTOP	TRCA2	10				
PLAINS BRISTLEGRASS	SEMA5	5				
LITTLE BLUESTEM	ANSC2	5				
SAND DROPSEED	SPCR	5				
OTHER SHRUBS	SSSS	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER ANNUAL FORBS	AAFF	5				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2700				
NORMAL YEARS		2000				
UNFAVORABLE YEARS		1300				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS", NOV. 1971.
B RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972.
D SANDY LOAM RANGE SITE.
1 RATINGS BASED ON SRWFC COMMITTEE IV GUIDE, DRAFT APR. 1970.

Established Series
Rev. WJR/VGL
12/72

BASCOM SERIES

The Bascom series is a member of the loamy-skeletal, carbonatic, thermic family of Ustollic Calciorthids. Typically, Bascom soils have brown and light brown calcarous fine sandy loam A horizons over pinkish gray strongly calcareous very gravelly fine sandy loam Cca horizons. Below about 35 inches the gravel rapidly decreases and the lime content gradually decreases.

Typifying Pedon: Bascom fine sandy loam - rangeland
(Colors are for dry soil unless otherwise stated.)

A11 0-8"--Brown (7.5YR 5/4) fine sandy loam, (7.5YR 4/4) moist; weak thick platy in the upper 1/2 to 1 inch and weak fine granular structure below; slightly hard, very friable, slightly sticky; many very fine and fine roots; many very fine and fine pores; few very hard subrounded lime nodules to 20mm. on lon dimension; strongly calcareous; moderately alkaline; clear wavy boundary. (6 to 12 inches thick)

A12 8-16"--Light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine and fine roots; many very fine and fine pores; few very hard subrounded lime nodules to 30mm. on long dimension; strongly calcareous; strongly alkaline; abrupt wavy boundary. (6 to 8 inches thick)

C1ca 16-36"--Pinkish gray (7.5YR 7/2) very gravelly fine sandy loam, (7.5YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; few very fine roots; many very fine and fine pores; about 55 percent rock fragments of strongly cemented lime, the interior of which are nearly white in color, fragments range up to about 75mm. on long dimension; very strongly calcareous; strongly alkaline; abrupt irregular boundary. (20 to 30 inches thick)

C2ca 36-48"--White (7.5YR 8/1) fine sandy loam, pinkish white (7.5YR 8/2) moist; massive; very hard, friable, slightly sticky; few very fine roots; many very fine pores; very strongly calcareous, strongly alkaline; abrupt smooth boundary. (8 to 14 inches thick)

C3 48-72"--Pale red (10R 6/3) loam, (10R 6/4) moist; massive; hard, friable, slightly sticky; many very fine and fine pores; occasional body of white lime embedded in matrix; strongly calcareous, strongly alkaline; less total lime than overlying horizon.

Type Location: Quay County, New Mexico; 1/4 mile west and 1/4 mile north of the SE corner of sec. 31, T.12N., R.35E.

Range in Characteristics: Depth to the very gravelly material and to the top of the calcic horizon ranges from 12 to 20 inches. The control section ranges from very gravelly fine sandy loam to very gravelly light sandy clay loam and very gravelly loam. Carbonate content ranges from 40 to about 65 percent in the control section. Soil temperature at a depth of 20 inches ranges from 59° to 66°F. The A horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4. The C1ca horizon ranges from pinkish gray to white. It has weak fine and medium subangular blocky structure or is massive. The C2ca horizon has about the same color range as the C1ca horizon but contains only a few scattered rock fragments and is massive.

Competing Series and their Differentiae: These are the Andrews, Arch, Aztec, Dean, Ildefonso, Jal, Karro, Laveldo, Mansker, Nickel, Polar, Potter, Sanpete, Stagecoach, Weiser, and Willard series. Andrews soils have average soil temperature of less than 47°F. and have limestone bedrock at depths of less than 40 inches. Arch and Karro soils contain less than 35 percent rock fragments and less than 40 percent carbonates in the control section. Aztec, Nickel, and Stagecoach soils contain less than 40 percent carbonates in the control section. Dean and Willard soils have soil temperatures between 47° and 59°F., have less than 35 percent rock fragments and less than 40 percent carbonates in the control section. Ildefonso soils have average annual soil temperatures between 47° to 59°F. and contain less than 40 percent carbonates in the control section. Jal and Laveldo soils contain less than 35 percent rock fragments in the control section and have aridic moisture regimes. Polar soils have mixed mineralogy and the Potter soils are shallow. Mansker soils have mollic epipedons and contain less than 35 percent rock fragments in the control section. Sanpete soils have mean annual soil temperatures between 47° and 59°F. at a depth of 20 inches. Weiser soils have aridic moisture regimes.

Setting: The Bascom soils are on undulating to gently rolling uplands with slopes ranging from 1 to 9 percent. The soils formed in moderately coarse to medium textured mixed sediments with high carbonate content. The parent material shows some influence of reworked Jurassic and Triassic redbed material. The general landscape is rounded ridge crests and valley bottoms; very few sharp features occur. The climate is semiarid continental. Near the type location, the average annual temperature is 58°F. and the average annual precipitation is about 14 inches of which more than 1/2 occurs in the summer months during heavy thunderstorms.

Principal Associated Soils: These are the Ima, La Lande, Montoya, Redona, and Tucumcari soils and the competing Potter soils. Ima and La Lande soils contain less than 35 percent rock fragments and lack calcic horizons. The Montoya soils have fine textured control sections, crack when dry, and contain less than 35 percent rock fragments in the control section. Redona soils are non-skeletal and have argillic horizons.

Drainage and Permeability: Well-drained; medium runoff; moderate to moderately rapid permeability.

Use and Vegetation: Principal use is rangeland. Native vegetation is primarily grama grass with some forbs, yucca, and mesquite.

Distribution and Extent: Northeastern New Mexico. The series is of moderate extent.

Series Established: Quay County (Tucumcari Area), New Mexico, 1969.

National Cooperative Soil Survey
U. S. A.

NM0319

S O I L I N T E R P R E T A T I O N S R E C O R D

SOIL SERIES FILE

BASCOM SERIES

MLRA(S): 70, 77
JSC, ~~4-75~~ SWA, 7-77
USTOLLIC CALCIORTHIDS, LOAMY-SKELETAL, CARBONATIC, THERMIC

THE BASCOM SERIES CONSISTS OF WELL-DRAINED SOILS WITH THIN SOLA ON UNDULATING OR GENTLY ROLLING UPLANDS. A TYPICAL PROFILE HAS A BROWN FINE SANDY LOAM SURFACE ABOUT 8 INCHES THICK. THE SUBSURFACE LAYER IS LIGHT BROWN FINE SANDY LOAM ABOUT 8 INCHES THICK OVER A STRONGLY CALCAREOUS PINKISH GRAY VERY GRAVELY FINE SANDY LOAM AND LOAM SUBSTRATUM. RUNOFF IS MEDIUM. MAP RANGES FROM 13 TO 16 INCHES. MAAT IS 57 TO 60F. MAST RANGES FROM 59 TO 66F. THE FROST-FREE SEASON IS 180 TO 200 DAYS. ELEVATIONS RANGE FROM 4000 TO 5000 FEET. SLOPES ARE 0 TO 9 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-16	FSL, L	SM, ML	A-4	0	90-100	85-100	60-90	35-65	20-30	NP-5
16-36	GRV-FSL, GRV-SCL, GRV-L	GM	A-1, A-2	0-10	40-60	35-55	30-50	15-35	20-35	NP-10
36-72	FSL, L	SM, ML	A-4	0	90-100	85-100	60-90	35-65	25-30	NP-5

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-16	10-20	-	2.0-6.0	0.13-0.17	7.9-8.4	<2	LOW	.32	2	3	.5-.8	HIGH	LOW
16-36	10-25	-	2.0-6.0	0.04-0.08	8.5-9.0	2-4	LOW	.20					
36-72	10-20	-	2.0-6.0	0.12-0.16	8.5-9.0	2-4	LOW	.37					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	LOW

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE
SEWAGE LAGOON AREAS	0-7%: SEVERE-SEEPAGE 7-9%: SEVERE-SEEPAGE, SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-SEEPAGE
SANITARY LANDFILL (AREA)	SEVERE-SEEPAGE
DAILY COVER FOR LANDFILL	FAIR-SMALL STONES

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE
DWELLINGS WITHOUT BASEMENTS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE
DWELLINGS WITH BASEMENTS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4-8%: MODERATE-SLOPE 8-9%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: MODERATE-LOW STRENGTH 8-9%: MODERATE-LOW STRENGTH, SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

CONSTRUCTION MATERIAL

ROADFILL	FAIR-LOW STRENGTH
SAND	POOR-EXCESS FINES
GRAVEL	POOR-EXCESS FINES
TOPSOIL	~~FAIR-SMALL STONES~~ FSL L: GOOD GRV: POOR - SMALL STONES

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SEEPAGE, SLOPE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH, PIPING
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	0-3%: FAVORABLE 3+%: SLOPE
IRRIGATION	0-1%: DROUGHTY, SOIL BLOWING 1+%: DROUGHTY, SOIL BLOWING, SLOPE
TERRACES AND DIVERSIONS	0-5%: SOIL BLOWING 5-9%: SLOPE, SOIL BLOWING
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATIONAL DEVELOPMENT

CAMP AREAS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE	PLAYGROUNDS	0-2%: SLIGHT 2-6%: MODERATE-SLOPE 6-9%: SEVERE-SLOPE
PICNIC AREAS	0-8%: SLIGHT 8-9%: MODERATE-SLOPE	PATHS AND TRAILS	SLIGHT

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
~~ALL~~	~~6S~~															
0-3 %	6e	4e														
3 + %	6e															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	FAIR	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
LITTLE BLUESTEM	ANSC2	20				
SIDEOATS GRAMA	BOCU	15				
NEEDLEANDTHREAD	STCO4	5				
NEW MEXICO FEATHERGRASS	STNE2	5				
BLACK GRAMA	BOER4	5				
WESTERN WHEATGRASS	AGSM	5				
BLUE GRAMA	BOGR2	20				
HAIRY GRAMA	BOHI2	5				
FRINGED SAGEWORT	ARFR4	5				
SAND DROPSEED	SPCR	5				
SMALL SOAPWEED	YUGL	5				
THREEAWN	ARIST	5				

POTENTIAL PRODUCTION (LBS./AC. DRY WT):					
FAVORABLE YEARS	1800				
NORMAL YEARS	1050				
UNFAVORABLE YEARS	400				

FOOTNOTES

all

Established Series
Rev. ERB
9/73

SOIL SERIES FILE

BLAKENEY SERIES

The Blakeney series is a member of the loamy, mixed, thermic, shallow family of Ustochreptic Paleorthids. These soils have brown, calcareous, fine sandy loam A horizons and pale brown fine sandy loam B horizons overlying Ccam horizons of strongly cemented platy caliche within 20 inches of the soil surface.

Typifying Pedon: Blakeney fine sandy loam - rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-7" -- Brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak subangular blocky structure; slightly hard; friable; common very fine and fine roots and pores; common strongly cemented caliche fragments 5 to 10 mm. in diameter; calcareous; moderately alkaline; gradual smooth boundary. (5 to 10 inches thick)

B2 -- 7-18" -- Pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak coarse prismatic parting to weak subangular blocky structure; slightly hard; friable; common very fine roots; common medium caliche fragments; calcareous; moderately alkaline; abrupt wavy boundary. (7 to 14 inches thick)

Ccam -- 18-32" -- White caliche, strongly cemented rounded caliche plates 2 to 4 inches in diameter; abrupt wavy boundary. (10 to 30 inches thick)

Cca -- 32-68"+-- Pinkish white weakly cemented caliche with about 25 percent of powdery masses of $CaCO_3$; massive.

Type Location: Andrews County, Texas; 50 feet north of a point on Texas 176; this point is 15 miles northwest of Andrews, Texas.

Range in Characteristics: Thickness of the solum ranges from 12 to 20 inches. The texture throughout is loam or fine sandy loam with 10 to 18 percent clay. The A horizon is brown (10YR 5/4, 5/3; 7.5YR 5/2, 5/3), pale brown (10YR 6/3), pinkish gray (7.5YR 6/2), light brownish gray (10YR 6/2), or grayish brown (10YR 5/2). The B horizon is brown (10YR 5/3; 7.5YR 5/2, 5/4), pale brown (10YR 6/3), light brown (7.5YR 6/4), or pinkish gray (7.5YR 6/2). The soil contains 5 to 20 percent fine to coarse caliche fragments. The Ccam horizon is indurated in the upper 1/2 to 2 inches. Caliche plates are 1 to 3 inches thick. The Cca horizon ranges from weakly to strongly cemented.

Competing Series and their Differentiae: These are the Conger, Kimbrough, Upton, Veal, and Simona Wink series. Conger and Upton soils contain more than 18 percent clay in the control section. Kimbrough soils have a mollic epipedon. Veal and Wink soils lack petrocalcic horizons.

Setting: Blakeney soils occupy nearly level to gently sloping ridges, divides, and footslopes. These soils developed in calcareous or loamy materials. The climate is semiarid. Annual P-E indices are 18 to 25. Annual precipitation is 10 to 17 inches. Average annual air temperature ranges from 63° to 69° F.

Principal Associated Soils: These include the competing Conger and Kimbrough series, and the Portales and Ratliff series. Portales and Ratliff soils have calcic horizons below 20 inches and Portales soils also have mollic epipedons.

Drainage and Permeability: Well drained. Surface runoff is medium. Permeability is moderately rapid in the upper 18 inches, and moderately slow or slow below.

Use and Vegetation: Used mostly for rangeland but a few acres are cultivated. Vegetation consists of sideoats grama, blue grama, vine-mesquite, black grama, plains bristlegrass, and hairy grama grasses and small mesquite trees.

USDA-SCS-FORT WORTH, TEX. 1974

Distribution and Extent: Southern part of the High Plains of Texas and possibly in adjoining areas in New Mexico. The soil is of moderate extent.

Series Established: Andrews County, Texas; 1970.

Remarks: These soils were previously included with the Simona series. They were classified in the Calcisol great soil group.

National Cooperative Soil Survey
U. S. A.

TX0122

SOIL SURVEY INTERPRETATIONS

MLRA(S): 77
ERB, 5-73
USTOCHREPTIC PALEORTHIDS, LOAMY, MIXED, THERMIC, SHALLOW

BLAKENEY S -I.S

THE BLAKENEY SERIES CONSISTS OF SHALLOW, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN CALCAREOUS LOAMY WIND OR WATER LAIN MATERIALS. IN A REPRESENTATIVE PROFILE THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 7 INCHES THICK. THE SUBSOIL IS PALE BROWN FINE SANDY LOAM ABOUT 11 INCHES THICK. THE SUBSTRATUM EXTENDS TO DEPTHS GREATER THAN 68 INCHES AND IS STRONGLY CEMENTED BETWEEN 18 AND 32 INCHES. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLAS-TICITY INDEX
0-18	FSL, L	SC, CL, CL-ML, SM-SC	A-4, A-2-4	0-5	75-95	70-95	60-85	30-55	18-27	4-10
18-32	IND									
32-68	VAR									

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
0-18	2.0-6.0	0.08-0.15	7.9-8.4	-	LOW	MODERATE	LOW	.24	1	3
18-32										
32-68										

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6			12-20	RIPPABLE	>60		-		C	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	SEVERE-CEMENTED PAN
SEWAGE LAGOON AREAS	SEVERE-CEMENTED PAN
SANITARY LANDFILL (TRENCH)	MODERATE-CEMENTED PAN
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	POOR-THIN LAYER

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	SEVERE-CEMENTED PAN
DWELLINGS WITHOUT BASEMENTS	SEVERE-CEMENTED PAN
DWELLINGS WITH BASEMENTS	SEVERE-CEMENTED PAN
SMALL COMMERCIAL BUILDINGS	SEVERE-CEMENTED PAN
LOCAL ROADS AND STREETS	MODERATE-CEMENTED PAN

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (A)

ROADFILL	POOR-THIN LAYER
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-THIN LAYER

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-CEMENTED PAN, SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-THIN LAYER, SEEPAGE
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ROOTING DEPTH, DROUGHTY
TERRACES AND DIVERSIONS	CEMENTED PAN
GRASSED WATERWAYS	ROOTING DEPTH, DROUGHTY

RECREATION (B)

CAMP AREAS	MODERATE-DUSTY	PLAYGROUNDS	SEVERE-DEPTH TO ROCK
PICNIC AREAS	MODERATE-DUSTY	PATHS AND TRAILS	MODERATE-DUSTY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-5%	6E															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		SHALLOW				
BLACK GRAMA	BOER4	30				
SIDEOATS GRAMA	BOCU	25				
PLAINS BRISTLEGRASS	SEMA5	10				
ARIZONA COTTONTOP	TRCA2	5				
BUFFALOGRASS	BUDA	5				
SAND DROPSEED	SPCR	5				
BURROGRASS	SCBR2	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER PERENNIAL FORBS	PPFF	10				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1400				
NORMAL YEARS		1000				
UNFAVORABLE YEARS		700				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS", NOV. 1971
B RECREATION RATINGS BASED ON SOILS MEMORANDUM 69, OCT. 1968
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
D SHALLOW RANGE SITE
RATINGS BASED ON SRWPC COMMITTEE IV GUIDE, DRAFT APR. 1970

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SOIL SERIES FILE

Established Series
Rev. ERB
9/73

BROWNFIELD SERIES

The Brownfield series is a member of the loamy, mixed, thermic family of Arenic Aridic Paleustalfs. These soils have brown fine sand A horizons about 26 inches thick and reddish sandy clay loam Bt horizons that extend below 60 inches.

Typifying Pedon: Brownfield fine sand - rangeland.
(Colors are for dry soil unless otherwise stated.)

A11 -- 0-6 inches, brown (7.5YR 5/3) fine sand, brown (7.5YR 4/3) moist; single grained; loose; common fine roots; neutral; clear smooth boundary. (4 to 8 inches thick)

A12 -- 6-26 inches, light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grained; common fine roots; loose; neutral; clear smooth boundary. (12 to 32 inches thick)

B21t -- 26-48 inches, red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate coarse prismatic structure parting to weak medium subangular blocky structure; very hard, friable; few fine roots; few fine pores; thin patchy clay films on vertical faces of prisms; neutral; gradual wavy boundary. (12 to 40 inches thick)

B22t -- 48-60 inches, reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate coarse prismatic parting to weak medium subangular blocky structure; hard, friable; thin patchy clay films on faces of peds; neutral; diffuse wavy boundary. (0 to 20 inches thick)

B23t -- 60-80 inches, reddish yellow (5YR 6/8) sandy clay loam, yellowish red (5YR 5/8) moist; weak coarse prismatic structure; slightly hard, friable; thin patchy clay films on faces of peds; mildly alkaline.

Type Location: Cochran County, Texas; 0.2 mile northwest of the windmill in sec. 12; 3/4 mile south of county road, from a point 1 3/4 miles east of its intersection with the north-south State Line Road, which intersection is 4 3/4 miles south of the intersection of State Line Road and Texas Highway 125, which intersection is 3.8 miles south of the village of Bledsoe.

Range in Characteristics: Thickness of solum ranges from 60 to more than 80 inches. Reaction of the soil ranges from neutral to mildly alkaline in the upper part of the solum, and from neutral to moderately alkaline in the lower part.

The A horizon is 20 to 40 inches thick. This horizon is light reddish brown (2.5YR 6/3, 6/4), light brown (7.5YR 6/4), reddish brown (5YR 5/3, 5/4), or brown (7.5YR 5/4, 5/3). It is fine sand, except where deep plowing has mixed some of the underlying sandy clay loam with fine sand.

The B2t horizons are reddish brown (2.5YR 4/4, 5/4; 5YR 4/4, 5/4), red (2.5YR 4/6, 5/6), reddish yellow (5YR 6/6, 6/8; 7.5YR 6/6, 6/8), or yellowish red (5YR 5/6, 5/8). These are sandy clay loam with clay content of 20 to 35 percent. Calcic horizons, if present, begin at depths greater than 60 inches.

Competing Series and their Differentiae: These include the Amarillo, Delwin, Devol, Grandfield, Heatly, Jalmar, Miles, Nobscot, Patricia, Pratt, Springer, and Triomas series. Amarillo, Delwin, Devol, Grandfield, Miles, Patricia, Pratt, Springer, and Triomas soils have A horizons less than 20 inches thick. Amarillo soils have calcic horizons at depths less than 60 inches. Delwin, Devol, Grandfield, Heatly, Miles, Nobscot, and Springer soils have soil moisture regimes that are dry for shorter periods of time than Brownfield soils. Devol, Nobscot, Pratt, and Springer soils contain less than 18 percent clay in the Bt horizon. Jalmar and Triomas soils receive less than 17 inches of annual precipitation and are dry for longer periods than Brownfield soils.

Setting: The Brownfield soils are on nearly level to undulating plains. Slopes are mostly less than 2 percent, but they are as much as 5 percent in some places. The regolith consists of moderately sandy to sandy materials that appear to be largely of eolian origin. The climate is semiarid to subhumid; mean annual precipitation is 17 to 22 inches. Thornthwaite annual P-E index is 23 to 32 and the mean annual temperature is 57° to 70 ° F.

Principal Associated Soils: These are the competing Amarillo and Patricia series and the Arvana and Tivoli series. Arvana soils have an indurated to strongly cemented horizon of $CaCO_3$ beginning at depths of 20 to 40 inches below the surface. Tivoli soils are sandy throughout and lack Bt horizons.

Drainage and Permeability: Well drained; very slow surface runoff; moderate permeability.

Use and Vegetation: Large areas are in range. Grasses are tall and midgrasses, mainly bluestems, indiangrass, switch grass, and tall dropseed; woody plants are Havard oak and some widely separated yucca and sand sage. Some irrigated areas are cropped to cotton and grain sorghum.

Distribution and Extent: Southern part of the High Plains of Texas and New Mexico and the Rolling Plains of Texas and western Oklahoma. The series is of large extent.

Series Established: Andrews County, Texas; 1941.

Remarks: The Brownfield series was formerly classified in the Reddish-Brown great soil group.

National Cooperative Soil Survey
U.S.A.

TX0118

SOIL SURVEY INTERPRETATIONS

MLRA(S): 77
ERB, 9-73
ARENIC ARIDIC PALEUSTALFS, LOAMY, MIXED, THERMIC

BROWNFIELD SERIES

THE BROWNFIELD SERIES CONSISTS OF DEEP, WELL DRAINED, MODERATELY PERMEABLE UNDULATING SOILS OF UPLANDS. THE SOIL FORMED IN SANDY EOLIAN MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN AND LIGHT BROWN FINE SAND ABOUT 26 INCHES THICK. THE SANDY CLAY LOAM SUBSOIL EXTENDS TO DEPTHS GREATER THAN 80 INCHES. THE SUBSOIL IS RED IN THE UPPER 22 INCHES AND REDDISH YELLOW BELOW 48 INCHES. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-26	FS	SP, SP-SM, SM-SC	A-2-4	0	100	98-100	95-100	5-20	<24	NP-4
26-80	SCL	SC, SM-SC	A-2-4,A-2-6,A-6,A-4	0	100	98-100	95-100	25-45	20-35	7-18

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-26	6.0-20	0.03-0.08	6.6-7.8	-	VERY LOW	LOW	LOW	.10	5	1
26-80	0.6-2.0	0.12-0.18	6.6-8.4	-	LOW	MODERATE	LOW	.24		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6					>60		-		A	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE
SANITARY LANDFILL (TRENCH)	MODERATE-TOO SANDY
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-TOO SANDY

COMMUNITY DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (B)

ROADFILL	GOOD
SAND	POOR-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-PIPING,SEEPAGE
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ERODES EASILY,FAST INTAKE
TERRACES AND DIVERSIONS	TOO SANDY
GRASSED WATERWAYS	ERODES EASILY

RECREATION (C)

CAMP AREAS	SEVERE-TOO SANDY	PLAYGROUNDS	SEVERE-TOO SANDY
PICNIC AREAS	SEVERE-TOO SANDY	PATHS AND TRAILS	SEVERE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		GRAIN SORGHUM (BU)													
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-5%	6E	4E	-	65												
0-5% SEV.ER.	6E	6E	-	-												

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	SIBERIAN ELM	35	GREEN ASH	20	HONEYLOCUST	30	OSAGE-ORANGE	20
	RUSSIAN-OLIVE	15	EASTERN REDCEDAR	15	ORIENTAL ARBORVITAE	20	ARIZONA CYPRESS	20

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (E)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: SANDY				
SAND BLUESTEM	ANHA	25				
LITTLE BLUESTEM	ANSC2	10				
GIANT DROPSEED	SPGI	10				
SAND DROPSEED	SPCR	5				
HAIRY GRAMA	BOHI2	5				
FALL WITCHGRASS	LECO	5				
SILVER BLUESTEM	ANSA	5				
CANE BLUESTEM	ANBA	5				
SAND LOVEGRASS	ERTR3	5				
OTHER SHRUBS	SSSS	10				
OTHER PERENNIAL FORBS	PPFF	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER ANNUAL GRASSES	AAGG	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		3200				
NORMAL YEARS		2200				
UNFAVORABLE YEARS		1200				

FOOTNOTES

A RATINGS BASED ON ENGINEERING TEST DATA OF 3 PEDONS FROM LAMB AND TERRY COUNTIES, TEXAS.
B RATINGS BASED ON "GUIDE FOR INTERPRETATING ENGINEERING USES OF SOILS," NOV. 1971.
C RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
D WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972.
E SANDY RANGE SITE.
1 RATINGS BASED ON SRWPC COMMITTEE IV GUIDE, DRAFT APR. 1970.

Established Series
Rev. WJR/VGL
11/72

CANEZ SERIES

The Canez series is a member of the fine-loamy, mixed, thermic family of Ustollic Haplargids. Typically, Canez soils have noncalcareous sola with brown very fine sandy loam A horizons, brown sandy clay loam B2t horizons, and reddish brown light sandy clay loam B3 horizons over calcareous sandy clay loam buried soil horizons.

Typifying Pedon: Canez fine sandy loam - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 0-8"--Brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak thick platy structure in upper 2 inches grading to weak fine granular structure in lower part; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; neutral; clear smooth boundary. (5 to 10 inches thick)

B2t 8-22"--Brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; common thin clay coatings on sand grains; neutral; clear wavy boundary. (8 to 16 inches thick)

B3 22-48"--Reddish brown (5YR 4/4) light sandy clay loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, nonplastic; common very fine and fine roots; many very fine pores; thin reddish stains on sand grains; few sandstone pebbles; neutral; abrupt wavy boundary. (15 to 30 inches thick)

Ab 48-54"--Brown (7.5YR 5/4) light sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; many fine and very fine pores; common fine soft lime bodies and seam fillings; calcareous; moderately alkaline; clear smooth boundary. (4 to 8 inches thick)

Bb 54-67"--Reddish brown (5YR 5/4) light sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, nonplastic; common very fine pores; common fine and medium soft lime bodies and seam filling; calcareous; moderately alkaline.

Type Location: Quay County, New Mexico; 150 feet west of the irrigation canal bridge in NW corner of sec. 8, T.11N., R.30E.

Range in Characteristics: Thickness of the solum and depth to buried horizons range from 28 to 56 inches. Mean annual soil temperature ranges from 59° to 71°F. Buried horizons and C horizons where present below the solum range from none to slightly calcareous with some segregated lime. Segregated lime ranges from few to common and medium to fine soft bodies and concretions. Calcium carbonate content ranges from 5 to 15 percent at depths shallower than 48 inches. The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, 3 or 4 moist, and chroma of 3.5 through 5. It ranges from heavy sandy loam to sandy clay loam. The B horizon has hue of 7.5YR or 5YR, value of 4 or 5 dry, 3 or 4 moist, and chroma of 3.5 through 5. The control section is heavy sandy loam to sandy clay loam.

Competing Series and their Differentiae: These are the Amarillo, Berino, Clovis, Courtland, Headquarters, McAllister, Palomas, Redona, and Tucumcari series. Amarillo soils are usually moist and are calcareous in the lower part of the solum. Berino soils have segregated lime in the lower B2 horizon and are dry in all parts of the moisture control section more than 3/4 of the time cumulative the soil temperature exceeds 41°F. Clovis soils have mesic soil temperature, and have a calcic horizon within 40 inches of the surface. Courtland soils have A horizons that are 17 to 36 inches thick. Headquarters soils are calcareous throughout the Bt horizon. McAllister soils have less than 45 percent sand in the control section and have a calcic horizon. Palomas soils are dry in all parts of the moisture control section more than 3/4 of the time cumulative the soil temperature exceeds 41°F. Redona soils are calcareous and have segregated lime in the lower part of the B2t horizon and have a calcic horizon within 48 inches of the surface. Tucumcari soils contain more than 35 percent clay in the control section.

Setting: Canez soils are on nearly level to moderately sloping alluvial fans and terraces. The soils formed in moderately coarse and medium textured slope wash and terrace sediments derived mostly from sandstone with minor admixtures from associated shale. The climate is semiarid continental. At the type location, the mean annual temperature is about 59°F., and the average annual precipitation is about 15 inches. One-half or more of the precipitation occurs between late May and early September as thunderstorms.

Principal Associated Soils: These are the Ima, La Lande, Montoya, Quay, and San Jose soils and the competing Tucumcari soils. Ima, La Lande, Montoya, Quay, and San Jose soils lack argillic horizons. San Jose soils contain less than 18 percent clay in the control section. La Lande soils are calcareous throughout.

Drainage and Permeability: Well-drained; medium runoff; moderate permeability.

Use and Vegetation: Rangeland and irrigated cropland. Native vegetation is mid and tall grasses, yucca, mesquite, and cactus with scattered juniper. Irrigated crops are cotton, alfalfa, broom corn, and feed grains.

Distribution and Extent: East-central New Mexico. The series is inextensive.

Series Established: Quay County (Tucumcari Area), New Mexico, 1969.

Remarks: This soil was formerly included with the Palomas series, but is now separated from Palomas soils mainly on soil moisture differences.

National Cooperative Soil Survey
U. S. A.

NM0345 SOIL INTERPRETATIONS RECORD

SOIL SERIES FILE

CANEZ SERIES

MLRA(S): 70
DSP-TCH. ~~12-76~~ 7-77
USTOLLIC HAPLARGIDS, FINE-LOAMY, MIXED, THERMIC.

THE CANEZ SERIES CONSISTS OF DEEP WELL DRAINED SOILS. THEY FORMED IN MODERATELY COARSE TEXTURED ALLUVIAL AND EOLIAN SEDIMENTS ON ALLUVIAL FANS. ELEVATIONS RANGE FROM 3800 TO 5300 FEET. THE MEAN ANNUAL PRECIPITATION IS 13 TO 16 INCHES. THE MEAN ANNUAL AIR TEMPERATURE IS 57 TO 60F, AND THE FROST FREE SEASON IS 180 TO 195 DAYS. TYPICALLY THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 8 INCHES THICK. THE SUBSOIL IS BROWN AND REDDISH BROWN SANDY CLAY LOAM ABOUT 40 INCHES THICK, AND THE SUBSTRATUM IS SANDY CLAY LOAM TO 60 INCHES. SLOPES RANGE FROM 0 TO 8 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	FSL	SM, ML	A-4	0	100	100	75-90	40-55	-	NP
0-8	LFS	SM	A-2	0	100	100	70-85	15-30	-	NP
8-48	SL, FSL, SCL	CL-ML, CL, SC, SM-SC	A-4, A-6	0	100	100	70-90	35-55	25-35	5-15
48-67	SL, FSL, SCL	~~CL-ML~~, ML, SM, ~~CL-SC~~	A-4	0	100	100	70-90	35-55	25-35	NP-10

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-8	5-15	-	2.0-6.0	0.13-0.15	6.6-8.4	-	LOW	.32	5	3	.5-1	HIGH	LOW
0-8	0-10	-	2.0-6.0	0.09-0.11	6.6-7.8	-	LOW	.24	5	2	.5-1		
8-48	18-25	-	0.6-2.0	0.12-0.16	6.6-8.4	-	LOW	.32					
48-67	18-25	-	0.6-2.0	0.12-0.16	7.9-8.4	-	LOW	.32					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	LOW

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE,SLOPE 7+%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4+%: MODERATE-SLOPE
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

REGIONAL INTERPRETATIONS

CONSTRUCTION MATERIAL

ROADFILL	FAIR-LOW STRENGTH
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	GOOD

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH,PIPING
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	0-5%: FAVORABLE 5+%: SLOPE
IRRIGATION	0-1% LFS: FAST INTAKE,SOIL BLOWING 1+% LFS: SLOPE,FAST INTAKE,SOIL BLOWING 0-1% FSL: SOIL BLOWING 1+% FSL: SLOPE,SOIL BLOWING
TERRACES AND DIVERSIONS	0-5%: SOIL BLOWING 5+%: SLOPE,SOIL BLOWING
GRASSED WATERWAYS	

RECREATIONAL DEVELOPMENT

CAMP AREAS	FSL: MODERATE-SOIL BLOWING LFS: MODERATE-TOO SANDY, SOIL BLOWING	PLAYGROUNDS	0-2% FSL: MODERATE-SOIL BLOWING 2-6% FSL: MODERATE-SLOPE, SOIL BLOWING 0-2% LFS: MODERATE-SOIL BLOWING, TOO SANDY 2-6% LFS: MODERATE-SLOPE, TOO SANDY 6+%: SEVERE-SLOPE
IC AREAS	FSL: MODERATE-SOIL BLOWING LFS: MODERATE-TOO SANDY, SOIL BLOWING	PATHS AND TRAILS	FSL: MODERATE-SOIL BLOWING LFS: MODERATE-TOO SANDY, SOIL BLOWING

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		ALFALFA HAY (TONS)		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		WHEAT (BU)		PASTURE (AUM)					
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
-1%	6E	2E		7		750				40		13				
-3%	6E	3E		6		675				35		11				
+%	6E	4E		4.5		-				-		8				
-3%	6E	3E		5.3		-				-		9				

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
-1% IRR	GOOD	GOOD	GOOD	-	-	FAIR	FAIR	GOOD	GOOD	-	FAIR	-
-3% IRR	FAIR	GOOD	GOOD	-	-	FAIR	FAIR	FAIR	GOOD	-	FAIR	-
+% IRR	FAIR	GOOD	GOOD	-	-	FAIR	POOR	V. POOR	GOOD	-	V. POOR	-
IRR	POOR	FAIR	FAIR	-	-	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: LFS	FSL			
ITTLE BLUESTEM	ANSC2	20	15			
LUE GRAMA	BOGR2	15	30			
AND BLUESTEM	ANHA	10	-			
IDEOATS GRAMA	BOCU	8	10			
AND DROPSEED	SPCR	5	5			
HREEAWN	ARIST	5	3			
AND SAGEBRUSH	ARFI2	5	-			
LACK GRAMA	BOER4	10	15			
UCCA	YUCCA	-	5			
EW MEXICO FEATHERGRASS	STNE2	-	5			
THER PERENNIAL GRASSES	PPGG	9	-			
THER PERENNIAL FORBS	PPFF	5	5			
THER ANNUAL FORBS	AAFF	5	5			
THER SHRUBS	SSSS	3	2			
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2000	1700			
NORMAL YEARS		1150	950			
UNFAVORABLE YEARS		600	500			

FOOTNOTES

Established Series
Rev. LHG/JBC
2/77

DONA ANA SERIES

The Dona Ana series consists of deep, well drained soils that formed in alluvial sediments derived principally from sedimentary rocks. Dona Ana soils are on alluvial fans and have slopes of 0 to 5 percent. The mean annual precipitation is about 9 inches and the mean annual air temperature is about 65°F.

Taxonomic Class: Fine-loamy, mixed, thermic Typic Haplargids.

Typical Pedon: Dona Ana sandy loam - rangeland. (Colors are for dry soil unless otherwise stated.)

A1--0 to 2 inches; reddish brown (5YR 5/3) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable; few fine roots; few very fine pores; slightly calcareous, lime generally disseminated but with few fine filaments; mildly alkaline; abrupt smooth boundary. (1 to 4 inches thick)

A3--2 to 6 inches; reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly calcareous, lime generally disseminated, few fine filaments of lime; mildly alkaline; abrupt smooth boundary. (3 to 6 inches thick)

B21tca--6 to 11 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; some sand grains have clay coats, others have carbonate coats; calcareous, lime disseminated and segregated in common filaments and few fine soft bodies; moderately alkaline; clear smooth boundary. (4 to 8 inches thick)

B22tca--11 to 15 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; some yellowish red (5YR 4/6) in a mosaic pattern increasing in amount in lower part; moderate fine prismatic and medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; some sand grains are coated with clay, others are coated with carbonate; calcareous, lime disseminated and in common filaments; moderately alkaline; clear smooth boundary. (4 to 10 inches thick)

B3ca--15 to 20 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine pores; strongly calcareous, many pink (5YR 7/3) carbonate cylindroids and nodules, light reddish brown (5YR 6/4) moist; moderately alkaline; clear smooth boundary. (2 to 6 inches thick)

C1ca--20 to 39 inches; pinkish white (7.5YR 8/2) and light reddish brown (5YR 6/4) light sandy clay loam, light brown (7.5YR 6/3) and reddish brown (5YR 5/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; strongly calcareous, many weakly expressed cylindroids; moderately alkaline; gradual wavy boundary. (10 to 20 inches thick)

C2ca--39 to 60 inches; light reddish brown (5YR 6/4) light sandy clay loam, light brown (7.5YR 6/3) and reddish brown (5YR 5/4) moist; massive; hard, firm; strongly calcareous, about 60 percent pinkish white (5YR 8/2) carbonate nodules and cylindroids, segregated carbonates decrease in amount as depth increases; moderately alkaline. (Several to many feet thick)

Type Location: Dona Ana County, New Mexico; south bank of gully; NE 1/4 sec. 23, T.22S., R.2E.

Range in Characteristics: The solum ranges from about 14 to 34 inches thick. Depth to the calcic horizon ranges from about 12 to 30 inches. Mean annual soil temperature ranges from 59° to 72°F. These soils are dry in all parts of the moisture control section more than 3/4 of the time that the soil temperature exceeds 41°F. The driest period extends from October through May.

The A horizon has hue of 5YR through 10YR, value of 5 through 7 dry, 2 through 5 moist, and chroma of 3 through 5. It is fine sandy loam or sandy loam. This horizon is massive or has weak subangulr blocky and granular structure and has thin platy structure in the upper 1/4 to 1/2 inch of some pedons.

Th B horizon has hue of 2.5YR through 7.5YR, value of 4 through 6 dry, 3 through 5 moist, and chroma of 3 through 6. It ranges from sandy loam and loam containing more than 45 percent sand to sandy clay loam. This horizon averages about 18 to 35 percent clay. It has weak medium prismatic to moderate medium ad fine subangular blocky structure.

The C horizon has hue of 5YR through 10YR. Calcium carbonate equibvalent of the lower part of the B horizon or the upper part of the C horizon ranges from 15 to about 40 percent and decreases as depth increases. Dry consistence of the zone of prominent lime accumulation ranges from soft to hard, and some carbonate nodules are indurated. Strata of gravel and sand are below the control section and calcic horizon in some pedons.

Competing Series: These are the Anway, Berino, Bucklebar, Cornville, Delano, Hap, Hi Vista (T), Madurez, Mohave, Palomas, Tijeras, and Tres Hermanos series. Anway, Berino, Cornville, Madurez, Mohave, Palomas, and Tijeras soils are not calcareous throughout the pedons. Anway, Bucklebar and Palomas soils lack calcic horizons, and Mohave soils have less than 45 percent sand in the Bt horizons. Delano soils have sola thicker than 34 inches. Hap and Tres Hermanos soils have 15 to 35 percent rock fragments in the Bt horizon. Hi Vista soils have a lithic contact within 40 inches of the surface.

Geographic Setting: The Dona Ana soils are on nearly level to gently sloping alluvial fans. The soils formed in sediments derived principally from limestone, calcareous sandstone, siltstone, shale, and small amounts of granite, monzonite, rhyolite, quartzite, and andesite. The climate is arid continental. Near the type location, the average annual precipitation is about 8 to 10 inches with a marked summer maximum. The average annual temperature is about 60°F. and the Thornthwaite P-E Index is about 12. The frost-free season is 180 to 220 days.

Geographically Associated Soils: These are the competing Berino and Tres Hermanos soils and the Jal, Sonoita and Stellar soils. Jal soils lack horizons of clay accumulation. Sonoita soils have less than 18 percent clay in the particle size control section. Stellar soils average more than 35 percent clay in the control section.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: These soils are used mainly for rangeland. Principal native vegetation is sand dropseed, bush muhly, Mormon tea, mesquite, creosotebush, and yucca.

Distribution and Extent: South-central and southwestern New Mexico. The series is moderately extensive.

Series Established: Dona Ana County, New Mexico; Lower Rio Grande Reconnaissance Survey, 1942.

National Cooperative Soil Survey
U.S.A.

SOIL SURVEY INTERPRETATIONS

MLRA(S): 42
REV. 5-73
TYPIC HAPLARGIDS, FINE-LOAMY, MIXED, THERMIC

DONA ANA SERIES

THE DONA ANA SERIES ARE WELL DRAINED SOILS. THEY FORMED IN MIXED ALLUVIUM AND WIND LAID SEDIMENTS ON ALLUVIAL FANS AND PIEDMONTS. SLOPES ARE 0-9 PERCENT. ELEVATIONS RANGE FROM 3000-5500 FEET. MEAN ANNUAL PRECIPITATION IS 7-10 INCHES. MEAN ANNUAL AIR TEMPERATURE IS 58-68 F, AND THE FROST FREE SEASON IS 90-220 DAYS. TYPICALLY THE SURFACE LAYER IS A REDDISH BROWN SANDY LOAM OR FINE SANDY LOAM ABOUT 4 INCHES THICK. THE SUBSOIL IS REDDISH BROWN CALCAREOUS SANDY CLAY LOAM ABOUT 35 INCHES THICK. THE SUBSTRATUM IS STRONGLY CALCAREOUS SANDY LOAM.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-4	FSL, SL	SM	A-2, A-4	0	95-100	90-100	60-85	30-50	<25	NP-4
0-4	LFS	SM	A-2	0	95-100	90-100	50-80	15-35	-	NP
4-39	SCL	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
39-60	SL	SM-SC, SM	A-2, A-4	0	95-100	90-100	60-75	30-45	20-35	5-10

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-4	2.0-6.0	0.10-0.13	7.4-7.8	<2	LOW	LOW	LOW	.24	2	3
0-4	2.0-6.0	0.08-0.10	7.4-7.8	<2	LOW	LOW	LOW	.17	2	2
4-39	0.6-2.0	0.13-0.17	7.9-8.4	2-4	MODERATE	HIGH	LOW	.32		
39-60	0.6-2.0	0.13-0.17	7.9-8.4	2-4	MODERATE	HIGH	LOW	.43		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	0-8%: MODERATE-PERCS SLOWLY 8+%: MODERATE-SLOPE,PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE,SLOPE 7+%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	MODERATE-SHRINK-SWELL
DWELLINGS WITH BASEMENTS	MODERATE-SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	0-4%: MODERATE-SHRINK-SWELL 4-8%: MODERATE-SLOPE,SHRINK-SWELL 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: MODERATE-SHRINK-SWELL,LOW STRENGTH 8+%: MODERATE-SLOPE,SHRINK-SWELL, LOW STRENGTH

REGIONAL INTERPRETATIONS

SOURCE MATERIAL

ROADFILL	FAIR-LOW STRENGTH,SHRINK-SWELL
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	FSL,SL: GOOD LFS: FAIR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH,COMPRESSIBLE,PIPING
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	0-3%: FAVORABLE 3+%: SLOPE
IRRIGATION	0-3%: SOIL BLOWING 3+%: ERODES EASILY,SLOPE,SOIL BLOWING
TERRACES AND DIVERSIONS	0-5%: ERODES EASILY,PIPING 5+%: SLOPE,ERODES EASILY,PIPING
GRASSED WATERWAYS	ERODES EASILY

RECREATION

CAMP AREAS	0-8% FSL,SL: SLIGHT 0-8% LFS: MODERATE-TOO SANDY,SOIL BLOWING 8+% FSL,SL: MODERATE-SLOPE 8+% LFS: MODERATE-SLOPE,TOO SANDY	PLAYGROUNDS	0-2% FSL,SL: SLIGHT 0-2% LFS: MODERATE-TOO SANDY 2-6% FSL,SL: MODERATE-SLOPE 2-6% LFS: MODERATE-SLOPE,TOO SANDY 6+%: SEVERE-SLOPE
PICNIC AREAS	0-8% FSL,SL: SLIGHT 0-8% LFS: MODERATE-TOO SANDY,SOIL BLOWING 8+% FSL,SL: MODERATE-SLOPE 8+% LFS: MODERATE-SLOPE,TOO SANDY	PATHS AND TRAILS	FSL,SL: SLIGHT LFS: MODERATE-TOO SANDY,SOIL BLOWING

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)		GRAIN SORGHUM (BU)		BARLEY (BU)		BEANS, DRY PINTO (LBS)		PASTURE (AUM)			
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-3%	7E	2E	-	1300	-	8	-	115	-	90	-	1500	-	21		
3-5%	7E	3E														
5+%	7E	-														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
IRR	ARIZONA CYPRESS	28	HONEYLOCUST	30	RUSSIAN-OLIVE	28		

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
NIRR	V. POOR	V. POOR	POOR	-	-	POOR	POOR	V. POOR	POOR	-	V. POOR	POOR
IRR	GOOD	GOOD	POOR	-	-	POOR	POOR	V. POOR	FAIR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: FSL,SL	LFS			
BLACK GRAMA	BOER4	28	25			
MESA DROPSEED	SPFL2	10	20			
SAND DROPSEED	SPCR	10	10			
TOBOSA	HIMU2	2	0			
OTHER PERENNIAL GRASSES	PPGG	15	20			
BUSH MUHLY	MUPO2	20	10			
SOAPTREE YUCCA 1/	YUEL	5	5			
BROOM SNAKEWEED 1/	GUSA2	5	5			
FOURWING SALTBUSH	ATCA2	5	5			
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		600	650			
NORMAL YEARS		350	400			
UNFAVORABLE YEARS		250	300			

FOOTNOTES

A ESTIMATES ARE BASED ON LL AND PI FROM 5 PEDONS FROM DONA ANA COUNTY, NEW MEXICO.

1 NOT USUALLY UTILIZED BY CATTLE AND SHEEP.

Established Series
Rev. ERB
10/74

Revised Draft

FASKIN SERIES

The Faskin series is a member of the fine-loamy, mixed, thermic family of Ustalfic Haplargids. These soils have a brown fine sandy loam A horizon and a thick reddish sandy clay loam Bt horizon with an accumulation of $CaCO_3$ at 42 inches.

Typifying Pedon: Faskin fine sandy loam - rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-8" -- Brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular and subangular blocky structure; hard, friable; nonsticky; common very fine roots and pores and few fine roots; neutral; clear smooth boundary. (6 to 18 inches thick)

B21t -- 8-20" -- Reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse prismatic parting to weak medium subangular blocky structure; very hard, friable, slightly sticky; common very fine roots; patchy clay films on faces of peds and prisms; sand grains coated and bridged with clay; neutral; clear smooth boundary. (10 to 35 inches thick)

B22t -- 20-34" -- Yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic parting to weak medium subangular blocky structure; very hard, friable, slightly sticky; few very fine to fine roots; nearly continuous clay films on faces of prisms and patchy clay films on faces of peds: mildly alkaline; clear smooth boundary. (12 to 29 inches thick)

B23t -- 34-42" -- Red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate coarse prismatic parting to weak medium subangular blocky structure; hard, friable, slightly sticky; common very fine pores; nearly continuous clay films on faces of prisms and patchy clay films on faces of peds; noncalcareous; moderately alkaline; gradual wavy boundary. (7 to 20 inches thick)

B24tca -- 42-66" -- Red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak coarse prismatic parting to weak medium subangular blocky structure; slightly hard, friable, slightly sticky; common patchy clay films on peds; 10 percent by volume of soft masses of $CaCO_3$, mainly coatings on faces of peds; calcareous; moderately alkaline; gradual wavy boundary. (6 to 24 inches thick)

B25t -- 66-80" -- Reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse prismatic parting to weak medium subangular blocky strucutre; slightly hard, friable, slightly sticky; few discontinuous clay films on faces of peds; many films and threads of $CaCO_3$; calcareous; moderately alkaline.

Type Location: Andrews County, Texas, in rangeland 0.5 mile west of a point on Farm Road 1788, this point is 13.1 miles south of intersection of Farm Road 1783 and Texas 176, this intersection is 9 miles east of Andrews, Texas.

Range in Characteristics: Solum thickness is more than 60 inches. The upper 20 inches of the Bt horizon is sandy clay loam with clay content of 20 to 35 percent. Depth to secondary carbonates is 30 to 60 inches. The A horizon is brown (7.5YR 5/2, 4/2, 5/4, 4,4), light brown (7.5YR 6/4), reddish brown (5YR 5/3, 4/3, 5/4, 4/4), or light reddish brown (5YR 6/3, 6/4). It is neutral or mildly alkaline. The A horizon is fine sandy loam, ~~to~~ loamy fine sand, fine sand or sandy clay loam. ~~The Bt horizons above~~ the Btca horizon is red (2.5YR 5/6, 4/6), yellowish red (5YR 5/6, 4/6), or reddish brown (5YR 5/3, 4/3, 5/4, 4/4; 2.5YR 5/4, 4/4). It ranges from clay loam to sandy clay loam, and from neutral through moderately alkaline. The Btca horizon is light red (2.5YR 6/6), red (2.5YR 5/6, 4/6), yellowish red (5YR 5/6, 4/6), or reddish

yellow (5YR 6/6). The texture is clay loam or sandy clay loam. Soft masses of $CaCO_3$ comprise 10 to 50 percent by volume of this horizon. The Bt horizon below the Btca horizon is light reddish brown (5YR 6/4), reddish yellow (5YR 6/6), yellowish red (5YR 5/6), light red (2.5YR 6/6), or red (2.5YR 5/6). Visible $CaCO_3$ comprises about 1 to 10 percent, mainly in the form of films, threads and powdery masses. Some pedons have a petrocalcic horizon at depths below 60 inches.

Competing Series and Their Differentiae: These are the Amarillo, Arvana, Bucklebar, Cacique, Douro, Macurez, Maljamar, Palomas, Patricia, Pyote, and Sharvana soils. The Amarillo, Arvana, and Patricia are dry in the moisture control section for shorter periods of time; they occur in areas that have more than 17 inches annual precipitation. Bucklebar, Cacique, and Madurez soils are dry in the moisture control section for longer periods of time; they occur in areas that have less than 13 inches of annual precipitation. The Palomas and Maljamar soils lack a calcic horizon; in addition, Maljamar and Pyote soils have sandy A horizons more than 20 inches thick. The Douro and Sharvana soils have petrocalcic horizons.

Setting: These soils occupy nearly level to gently sloping uplands. Slopes range from 0 to 3 percent. The regolith consists of eolian sediments. The climate is semiarid. The Thornthwaite annual P-E indices is 18 to 23. Annual precipitation is 13 to 17 inches. The mean annual air temperature ranges from 63° to 69°F.

Principal Associated Soils: These are the Douro, Maljamar and Palomas soils of the competing series and the Stegall, Slaughter, Ratliff, and Portales soils. Portales soils have a mollic epipedon and Ratliff soils lack an argillic horizon. The Stegall and Slaughter soils are more clayey and have a petrocalcic horizon.

Drainage and Permeability: Well drained; runoff slow to medium; permeability moderate.

Use and Vegetation: Used mostly for rangeland. Vegetation consists of black grama, plains bristlegrass, sand dropseed, buffalograss, Arizona cottontop, little bluestem and threeawn grasses, broom snakeweed, catclaw, and a few small mesquite trees. A few areas are irrigated or dry farmed to cotton and grain sorghums.

Distribution and Extent: Southern part of the High Plains in west Texas. The series is of moderate extent.

Series Established: Andrews County, Texas; 1970.

Remarks: These soils were previously classified a Reddish Chestnut soil.

National Cooperative Soil Survey
U. S. A.

SOIL SERIES FILE

TX0144 S O I L S U R V E Y I N T E R P R E T A T I O N S

FASKIN SERIES

MLRA(S): 70, 77
REV. FRB 10-74
USTALFIC HAPLARGIDS, FINE-LOAMY, MIXED, THERMIC

THE FASKIN SERIES CONSISTS OF DEEP, WELL DRAINED NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN LOAMY OR SANDY EOLIAN MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN FINE SANDY LOAM ABOUT 8 INCHES THICK. THE SANDY CLAY LOAM SUBSOIL EXTENDS TO A DEPTH BELOW 80 INCHES AND HAS PROMINENT ACCUMULATIONS OF CALCIUM CARBONATE BETWEEN 42 AND 66 INCHES. THE SUBSOIL IS REDDISH BROWN IN THE UPPER 12 INCHES, YELLOWISH RED IN THE NEXT 14 INCHES, RED IN THE NEXT 32 INCHES AND REDDISH YELLOW BELOW 66 INCHES. SLOPES RANGE FROM 0 TO 3 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	FSL	SM, SM-SC, CL-ML, ML	A-2-4, A-4	0	100	100	80-100	35-55	17-25	3-7
0-8	LFS, FS	SM, SM-SC	A-2-4	0	100	100	75-98	15-35	<22	NP-4
0-8	SCL	SC, SM-SC, CL, CL-ML	A-4, A-6	0	100	100	85-100	36-70	22-40	5-20
8-42	SCL, CL	SC, SM-SC, CL, CL-ML	A-4, A-6	0	100	100	65-100	36-70	22-40	5-20
42-80	SCL, CL	SC, SM-SC, CL, CL-ML	A-4, A-6	0	90-100	90-100	60-98	36-70	22-35	5-17

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
0-8	2.0-6.0	0.10-0.15	6.6-7.8	-	LOW	LOW	LOW	.24	5	3
0-8	2.0-6.0	0.06-0.10	6.6-7.8	-	VERY LOW	LOW	LOW	.15	5	2
0-8	0.6-2.0	0.12-0.18	6.6-7.8	-	LOW	MODERATE	LOW	.32	5	3
8-42	0.6-2.0	0.12-0.18	7.4-8.4	-	LOW	MODERATE	LOW	.32		
42-80	0.6-2.0	0.10-0.15	7.9-8.4	-	LOW	MODERATE	LOW	.32		

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			>60		>60		-		B	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (A)

ROADFILL	FAIR-LOW STRENGTH
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	FSL: FAIR-THIN LAYER FS,LFS: POOR-TOO SANDY SCL: FAIR-TOO CLAYEY

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-SEEPAGE,PIPING
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	FSL: ERODES EASILY FS,LFS: TOO SANDY,ERODES EASILY SCL: ERODES EASILY
TERRACES AND DIVERSIONS	FSL: FAVORABLE FS,LFS: TOO SANDY SCL: FAVORABLE
GRASSED WATERWAYS	ERODES EASILY

A[illegible]IES

RECREATION (B)

CAMP AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY SCL: MODERATE-TOO CLAYEY	PLAYGROUNDS	0-2% FSL: SLIGHT 2-3% FSL: MODERATE-SLOPE 0-2% LFS: MODERATE-TOO SANDY 2-3% LFS: MODERATE-SLOPE,TOO SANDY SCL: MODERATE-TOO CLAYEY
PICNIC AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY SCL: MODERATE-TOO CLAYEY	PATHS AND TRAILS	FSL: SLIGHT LFS: MODERATE-TOO SANDY SCL: MODERATE-TOO CLAYEY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		GRAIN SORGHUM (BU)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
FSL.SCL	4E	3E	150	850	15	100										
FS.LFS	6E	4E	-	750	-	90										

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	SIBERIAN ELM	35	GREEN ASH	20	HONEYLOCUST	30	OSAGEORANGE	20
	RUSSIAN-OLIVE	15	EASTERN REDCEDAR	15	ORIENTAL ARBORVITAE	20	ARIZONA CYPRESS	20

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
FSL.SCL	POOR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR
FS.LFS	POOR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		FSL.SCL	FS.LFS			
BLUE GRAMA	BOGR2	30	10			
SIDEOATS GRAMA	BOCU	15	10			
PLAINS BRISTLEGRASS	SEMA5	5	10			
BLACK GRAMA	BOER4	10	5			
BUFFALOGRASS	BUDA	10	-			
ARIZONA COTTONTOP	TRCA2	5	5			
SAND DROPSEED	SPCR	5	5			
HOODED WINDMILLGRASS	CHCU2	5	5			
LITTLE BLUESTEM	ANSC2	-	10			
HAIRY GRAMA	BOHI2	-	5			
GIANT DROPSEED	SPGI	-	5			
MESA DROPSEED	SPFL2	-	5			
OTHER SHRUBS	SSSS	5	10			
OTHER PERENNIAL FORBS	PPFF	5	5			
OTHER PERENNIAL GRASSES	PEGG	5	10			
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		2200	2000			
NORMAL YEARS		1650	1500			
UNFAVORABLE YEARS		1100	1000			

FOOTNOTES

RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS". NOV. 1971.

ECREATION RATINGS BASED ON SOIL MEMORANDUM-69, OCT. 1968.

C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972.

D FSL.SCL:SANDY LOAM RANGE SITE; LFS.FS:LOAMY SAND RANGE SITE

1 RATINGS BASED ON SR*PC COMMITTEE IV GUIDE. DRAFT APR. 1970.

Established Series
Rev. JEJ/MSJ/YHH
9/73

GLENDALE SERIES

The Glendale series is a member of the fine-silty, mixed (calcareous), thermic family of Typic Torrifluvents. Typically, Glendale soils are deep, well-drained, have light brownish gray A horizons and grayish brown clay loam or silty clay loam C horizons and are calcareous throughout.

Typifying Pedon: Glendale loam - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 0-8"--Light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; upper 1/2 inch is weak medium platy structure, lower 7 1/2 inches is massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; few very fine and fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary. (6 to 12 inches thick)

C1 8-18"--Grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine and coarse subangular blocky structure; very hard, friable, slightly sticky, plastic; few very fine and fine roots; few very fine and fine tubular and few fine interstitial pores; strongly effervescent; common very fine and fine white (N 8/) mycelia-like veins of lime and salt; moderately alkaline (pH 8.0); clear smooth boundary. (10 to 30 inches thick)

C2 18-42"--Grayish brown (10YR 5/2) silty clay loam, brown (10YR 4/3) moist; massive; very hard, friable, sticky, plastic; few very fine and fine roots; few very fine tubular pores; strongly effervescent; common to many very fine and fine white (N 8/) mycelia-like veins of lime and salt; moderately alkaline (pH 8.0).

Type Location: Graham County, Arizona; 400 feet east of NW1/4 corner sec. 5, T.8S., R.26E.

Range in Characteristics: These soils are usually dry unless irrigated. Mean annual soil temperature ranges from 59° to 72°F. Common white mycelia-like lime veins of salt are present in some pedons. Some pedons are strongly alkaline throughout. The A horizon has hue of 7.5YR or 10YR, value of 5 through 7 dry, 3.5 through 5 moist, and chroma of 2 through 4. The C horizon has hue dominantly of 10YR or 7.5YR but ranging through 5YR. The 10- to 40-inch section is heavy loam, heavy silt loam, light clay loam or light silty clay loam containing 18 to 35 percent clay and less than 15 percent fine and coarser sand. The soil is commonly of uniform texture to depths of 50 inches, but some pedons have strata less than 1 inch thick of finer or coarser texture in the control section and some are stratified below the control section.

Competing Series and their Differentiae: These are the Gila, Glenbar, Grabe, Guest, McClellan, and Pima series. Gila soils have less than 18 percent clay in the control section. Glenbar and McClellan soils have hyperthermic temperature. Grabe, Guest, and Pima soils have mollic epipedons. Guest soils have fine texture.

Setting: The Glendale soils are on floodplains and low stream terraces at elevations of 2,200 feet to 5,000 feet. They formed in mixed alluvium derived from many kinds of rocks. The climate is warm, arid or semiarid continental. Average annual precipitation is 7 to 12 inches. The mean annual temperature ranges from 57° to 69°F. and the frost-free season ranges from 200 to 275 days.

Principal Associated Soils: These are the Anthony, Brazito, Comoro, Mohave, and Vinton soils and the competing Gila, Glenbar, Grabe, Guest, McClellan, and Pima soils. Anthony and Comoro soils have moderately coarse texture. Brazito and Vinton soils have coarse texture. Mohave soils have argillic horizons.

Drainage and Permeability: Well-drained; medium to slow runoff; moderately slow permeability.

Use and Vegetation: Used for range and where irrigated for cultivated crops and pastures. Alfalfa, cotton, grain, and vegetables are common irrigated crops. Native plants are creosotebush, mesquite, palo verde, ironwood, salt cedar, cacti, annual weeds and grasses.

Distribution and Extent: Arizona and possibly California and New Mexico. Glendale soils are extensive.

Series Established: Maricopa County (Queen Creek SCD), Arizona, 1946.

Remarks: The Glendale soils were formerly classified as Alluvial soils.

NOTE: Type location—Soil Samples S63ARIZ-5-41(1-3) used in Safford Area, Arizona correlation.

National Cooperative Soil Survey
U. S. A.

SOIL SURVEY INTERPRETATIONS

MLRA(S): 41, 42
KDV, 5-73
TYPIC TORRIFLUVENTS, FINE-SILTY, MIXED (CALCAREOUS), THERMIC

GLENDALE SERIES

THE GLENDALE SERIES CONSISTS OF DEEP, WELL DRAINED, MODERATELY SLOWLY PERMEABLE SOILS FORMED IN MIXED ALLUVIUM ON FLOODPLAINS AND LOW TERRACES. TYPICALLY THESE SOILS HAVE A LIGHT BROWNISH-GRAY LOAM SURFACE LAYER 2 INCHES THICK OVER A GRAYISH-BROWN CLAY LOAM UPPER SUBSTRATUM 10 INCHES THICK. THE LOWER SUBSTRATUM IS GRAYISH-BROWN SILTY CLAY LOAM TO 60 INCHES. ELEVATIONS ARE FROM 2200 TO 4500 FEET. PRECIPITATION IS 8 TO 14 INCHES. THE FROST-FREE SEASON IS 200 TO 275 DAYS. SLOPES ARE 0 TO 2 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-12	C, SIC	CH	A-7	0	100	100	95-100	80-95	55-65	35-45
0-12	FSL, L	SM, ML	A-4	0	95-100	95-100	75-85	40-60	20-30	NP-5
0-12	SIL, CL, SICL	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
12-60	SIL, CL, SICL	CL	A-6	0	100	100	95-100	75-90	30-40	15-25

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
0-12	0.06-0.2	0.14-0.17	7.9-8.4	2-4	HIGH	HIGH	LOW	-	-	-
0-12	0.6-2.0	0.13-0.15	7.9-8.4	2-4	LOW	HIGH	LOW	-	-	-
0-12	0.2-0.6	0.16-0.21	7.9-8.4	2-4	MODERATE	HIGH	LOW	-	-	-
12-60	0.2-0.6	0.16-0.21	7.9-8.4	2-4	MODERATE	HIGH	LOW	-		

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
RARE-COMMON	BRIEF	JUL-SEP	>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	COMMON, RARE: SEVERE-FLOODS PROTECTED: SLIGHT
SANITARY LANDFILL (TRENCH)	PROTECTED: MODERATE-TOO CLAYEY COMMON: SEVERE-FLOODS RARE: MODERATE-FLOODS, TOO CLAYEY
SANITARY LANDFILL (AREA)	RARE: MODERATE-FLOODS COMMON: SEVERE-FLOODS PROTECTED: SLIGHT
DAILY COVER FOR LANDFILL	FAIR-TOO CLAYEY

SOURCE MATERIAL

ROADFILL	POOR-LOW STRENGTH
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	C, SIC: POOR-TOO CLAYEY L, SIL, FSL: FAIR-THIN LAYER CL, SICL: FAIR-TOO CLAYEY

WATER MANAGEMENT

POND RESERVOIR AREA	FAVORABLE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH, SHRINK-SWELL, COMPRESSIBLE
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	FLOODS
IRRIGATION	FSL, L, SIL, CL, SICL: FAVORABLE C, SIC: TOO CLAYEY, SLOW INTAKE
TERRACES AND DIVERSIONS	PIPING
GRASSED WATERWAYS	

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	RARE: MODERATE-FLOODS, TOO CLAYEY COMMON: SEVERE-FLOODS PROTECTED: MODERATE-TOO CLAYEY
DWELLINGS WITHOUT BASEMENTS	COMMON, RARE: SEVERE-FLOODS PROTECTED: MODERATE-LOW STRENGTH, SHRINK-SWELL
DWELLINGS WITH BASEMENTS	COMMON, RARE: SEVERE-FLOODS PROTECTED: MODERATE-LOW STRENGTH, SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	COMMON, RARE: SEVERE-FLOODS PROTECTED: MODERATE-LOW STRENGTH, SHRINK-SWELL
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

REGIONAL INTERPRETATIONS

Established Series
Rev. MVH/VGL/BDS
2/74

HOLLOMAN SERIES

The Holloman series is a member of the fine-loamy, gypsic, thermic, shallow family of Typic Torriorthents. Typically, Holloman soils have light gray and brown calcareous A horizons, pale brown calcareous loam C1 horizons over highly gypsiferous material or gypsum bedrock at depth of 9 inches.

Typifying Pedon: Holloman loam - pasture
(Colors are for dry soil unless otherwise stated.)

A11 0-1"--Light gray (10YR 7/2) loam, brown (10YR 5/3) moist, moderate very thin and thin platy structure; soft, very friable, slightly plastic; many fine and very fine roots; common very fine pores; strongly calcareous; mildly alkaline; abrupt smooth boundary. (0 to 3 inches thick)

A12 1-5"--Brown (10YR 5/3) loam, (10YR 4/3) moist; massive; soft, very friable, slightly sticky, slightly plastic; many fine and very fine roots; common very fine pores; many distinct gypsiferous crystals and lime filaments; strongly calcareous; mildly alkaline; clear smooth boundary. (0 to 6 inches thick)

C1 5-9"--Pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky, slightly plastic; fine and very fine roots; common very fine pores; many distinct gypsiferous crystals and lime filaments; strongly calcareous; mildly alkaline; abrupt wavy boundary. (3 to 7 inches thick)

C2cs 9-28"--Very pale brown (10YR 8/3) gypsum, very pale brown (10YR 7/3) moist; massive; soft, very friable, few pores; common slightly hard and hard gypsum lenses; strongly calcareous; gradual wavy boundary. (15 to 30 inches thick)

C3cs 28-60"--Pink (7.5YR 8/4) gypsum, reddish yellow (7.5YR 7/6) moist; intermingled with white (10YR 8/2) gypsum, light gray (10YR 7/2) moist; massive; soft, very friable, plastic; strongly calcareous; mildly alkaline.

Type Location: Eddy County, New Mexico; 3 miles northwest of Loving; 455 feet east and 150 feet north of SW corner SE 1/4 of sec. 12, R.27E., T.23S.

Range in Characteristics: A dense layer of gypsiferous material or gypsum bedrock is at depths of less than 20 inches. Annual soil temperature ranges from 59° to 69°F. The A horizon has hue of 5YR through 10YR, value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. The C1 horizon has hue of 5YR through 10YR, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. The control section ranges from heavy fine sandy loam to heavy loam and silt loam. It usually has segregated lime and gypsum in soft bodies, filaments, or crystals. The restricting gypsiferous layer usually has a weak platy or granular structure in the upper one or two inches and grades to weak subangular blocky structure or it is massive. The highly gypsiferous material ranges in consistency from soft to hard with the maximum hardness being about 2.5 or 3 on the Mohs scale. The color ranges widely depending on the source and geologic formation.

Competing Series and their Differentiae: These are the Cottonwood, Dos Cabezas, Jal, Largo, Mescal, Purgatory, Reeves and Retriever series. Cottonwood have a moisture regime bordering ustic. Dos Cabezas and Mescal soils are deeper than 20 inches to highly gypsiferous material and have a mesic temperature regime. Purgatory soils have a calcic horizon and are underlain by gypsiferous shale. Reeves soils are deeper than 20 inches to gypsiferous material and have a calcic horizon. Retriever soils have a lithic contact at depths of less than 20 inches.

Setting: These soils are on nearly level to gently sloping uplands at elevations of 3,000 to 3,800 feet. Slopes are dominantly 0 to 3 percent, but they range up to 20 percent. The parent material weathered from impure soft and rock gypsum beds. The climate is arid to semiarid; rainfall ranges from 10 to 13 inches. Annual temperature is 60° to 64°F.

Principal Associated Soils: These are the Berino, Kermit, Reeves, Simona, and Upton soils. Berino soils have argillic horizons. Kermit soils have sandy textures in the control section. Reeves soils have a calcic horizon. Simona and Upton soils have petrocalcic horizons within 20 inches of the surface.

Series Established: White Sands Missile Range, New Mexico, 1970.

Remarks: Holloman soils were formerly in the Cottonwood series. Cottonwood soils now have a moisture regime bordering ustic.

National Cooperative Soil Survey
U. S. A.

NM0047

SOIL INTERPRETATIONS RECORD

HOLLOMAN SERIES

MLRA(S): 42
REV. MVH, 11-76
TYPIC TORRIORTHENTS, LOAMY, GYPSIC, THERMIC, SHALLOW

THE HOLLOMAN SERIES CONSISTS OF VERY SHALLOW AND SHALLOW WELL DRAINED SOILS. THEY FORMED IN MATERIAL WEATHERED FROM GYPSUM AND ALLUVIAL SEDIMENTS ON UPLANDS. SLOPES ARE 0 TO 50 PERCENT. ELEVATION RANGES FROM 3000 TO 4800 FEET. MEAN ANNUAL PRECIPITATION IS 10 TO 12 INCHES. MEAN ANNUAL AIR TEMPERATURE IS 59 TO 64F. AND THE FROST FREE SEASON IS 200 TO 220 DAYS. TYPICALLY THE SURFACE LAYER IS A LIGHT GRAY AND BROWN LOAM ABOUT 5 INCHES THICK. THE NEXT LAYER IS A PALE BROWN LOAM ABOUT 4 INCHES THICK AND WEATHERED GYPSUM IS AT 9 INCHES. SLOPES ARE 0 TO 50 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-9	L, VFSL	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
9	WB									

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-9			0.6-2.0	0.12-0.14	7.4-8.4	4-16	LOW	.49	1	4L		HIGH	HIGH
9													

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		4-20	RIPPABLE	-		C	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS 1	0-15%: SEVERE-DEPTH TO ROCK 15+%: SEVERE-DEPTH TO ROCK,SLOPE
SEWAGE LAGOON AREAS	0-7%: SEVERE-DEPTH TO ROCK 7+%: SEVERE-SLOPE,DEPTH TO ROCK
SANITARY LANDFILL (TRENCH) 1	0-25%: SEVERE-DEPTH TO ROCK 25+%: SEVERE-DEPTH TO ROCK,SLOPE
SANITARY LANDFILL (AREA) 2	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
DAILY COVER FOR LANDFILL	0-15%: POOR-AREA RECLAIM,THIN LAYER 15+%: POOR-AREA RECLAIM,SLOPE,THIN LAYER

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	0-8%: MODERATE-DEPTH TO ROCK 8-15%: MODERATE-DEPTH TO ROCK,SLOPE 15+%: SEVERE-SLOPE
DWELLINGS WITHOUT BASEMENTS 3	0-8%: MODERATE-DEPTH TO ROCK,LOW STRENGTH 8-15%: MODERATE-DEPTH TO ROCK,LOW STRENGTH, SLOPE 15+%: SEVERE-SLOPE
DWELLINGS WITH BASEMENTS 3	0-15%: SEVERE-DEPTH TO ROCK 15+%: SEVERE-DEPTH TO ROCK,SLOPE
SMALL COMMERCIAL BUILDINGS 3	0-4%: MODERATE-DEPTH TO ROCK,LOW STRENGTH 4-8%: MODERATE-DEPTH TO ROCK,LOW STRENGTH, SLOPE 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: MODERATE-DEPTH TO ROCK,LOW STRENGTH 8-15%: MODERATE-DEPTH TO ROCK,LOW STRENGTH, SLOPE 15+%: SEVERE-SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

REGIONAL INTERPRETATIONS

CONSTRUCTION MATERIAL

ROADFILL	0-25%: POOR-AREA RECLAIM,THIN LAYER 25+%: POOR-AREA RECLAIM,SLOPE,THIN LAYER
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	0-15%: POOR-AREA RECLAIM,EXCESS SALT 15+%: POOR-AREA RECLAIM,EXCESS SALT,SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA 3	0-2%: DEPTH TO ROCK,SEEPAGE 2+%: DEPTH TO ROCK,SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES 3	LOW STRENGTH,PIPING,EXCESS SALT
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE 3	0-5%: DEPTH TO ROCK,EXCESS SALT, COMPLEX SLOPE 5+%: SLOPE,DEPTH TO ROCK,EXCESS SALT
IRRIGATION	0-5%: DROUGHTY,EXCESS SALT,ROOTING DEPTH 5+%: EXCESS SALT,ROOTING DEPTH,SLOPE
TERRACES AND DIVERSIONS	0-5%: DEPTH TO ROCK,ROOTING DEPTH, COMPLEX SLOPE 5+%: DEPTH TO ROCK,ERODES EASILY,SLOPE
GRASSED WATERWAYS	

RECREATIONAL DEVELOPMENT

CAMP AREAS	0-8%: MODERATE-DUSTY 8-15%: MODERATE-DUSTY,SLOPE 15+%: SEVERE-SLOPE	PLAYGROUNDS	0-2%: MODERATE-DEPTH TO ROCK,DUSTY 2-6%: MODERATE-DEPTH TO ROCK,DUSTY,SLOPE 6+%: SEVERE-SLOPE
PICNIC AREAS	0-8%: MODERATE-DUSTY 8-15%: MODERATE-DUSTY,SLOPE 15+%: SEVERE-SLOPE	PATHS AND TRAILS	0-15%: MODERATE-DUSTY 15-25%: MODERATE-DUSTY,SLOPE 25+%: SEVERE-SLOPE

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)		GRAIN SORGHUM (BU)		SORGHUM SILAGE (TONS)		CORN SILAGE (TONS)		BARLEY (BU)		PASTURE (AUM)	
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-15%	7S	-														
15+%	7E	-														
0-3% THICK SURF.	7S	4S		625		4		45		10		10		60		11
3-5% THICK SURF.	7S	4E														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
NIRR	V. POOR	V. POOR	POOR	-	-	POOR	V. POOR	V. POOR	V. POOR	-	V. POOR	POOR
IRR	POOR	POOR	FAIR	-	-	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: THIN SURFACE	THICK SURF.	STR. SALINE		
ALKALI SACATON	SPAI	20	20	70		
TOBOSA	HIMU2	5	15	-		
BURROGRASS	SCBR2	15	20	3		
MORMON-TEA	EPHED	5	5	-		
GYP GRAMA	BOBR	25	-	-		
FOURWING SALTBUSH	ATCA2	5	5	3		
WINTERFAT	EULA5	2	3	-		
BUSH MUHLY	MUPO2	3	-	-		
OTHER PERENNIAL FORBS	PPFF	5	5	3		
COLDENIA	COLDE	15	-	-		
VINE-MESQUITE	PAOB	-	5	5		
BLUE GRAMA	BOGR2	-	15	-		
SAND DROPSEED	SPCR	-	7	-		
INLAND SALTGRASS	DIST	-	-	10		
SEEPWEED	SUAED	-	-	6		
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		600	750	1100		
NORMAL YEARS		450	550	950		
UNFAVORABLE YEARS		250	300	800		

FOOTNOTES

A ESTIMATES ARE BASED ON ENGINEERING TEST DATA OF 2 PEDONS FROM EDDY COUNTY, NEW MEXICO.

1 VARIABLE PERMEABILITY AND PIPING OF THE GYPSUM BEDROCK MAY CAUSE POLLUTION OF THE GROUND WATER.

2 POOR COVER MATERIAL, DUST, AND VARIABLE PERMEABILITY OF THE GYPSUM BEDROCK MAY BE A LIMITATION.

3 VARIABLE PERMEABILITY, PIPING AND SOLUTION OF THE GYPSUM BEDROCK ARE A POTENTIAL LIMITATION.

Revised

Established
Rev. WJR/BGL/BDS
6/77

IMA SERIES

The Ima series consists of deep, well drained soils formed in alluvium mainly from red sandstone and shale. Ima soils are on nearly level to moderately sloping upland plains, alluvial fans and piedmonts. The soils formed in moderately coarse-textured sediments. The mean annual precipitation is about 16 inches; the mean annual air temperature is about 59° F.

Taxonomic Class: Coarse-loamy, mixed, thermic Ustochreptic Camborthids.

Typifying Pedon: Ima sandy loam - rangeland
(Colors are for dry soil unless otherwise stated.)

A11--0 to 5 inches; reddish brown (5YR 5/3) sandy loam, reddish brown (5YR 4/3) moist; weak fine granular structure with weak thin and medium platy structure in the upper 1 to 2 inches; soft, very friable, common fine roots; common fine and very fine pores; mildly alkaline; clear smooth boundary. (2 to 6 inches thick)

A12--5 to 10 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/3) moist; very weak fine subangular blocky structure; slightly hard, very friable; common fine roots; common fine and very fine pores; mildly alkaline; clear smooth boundary. (4 to 8 inches thick)

B21--10 to 32 inches; light reddish brown (5YR 6/4) fine sandy loam,
reddish brown (5YR 4/4) moist; weak medium prismatic parting to weak medium subangular blocky structure; slightly hard, friable, slightly sticky; few fine roots; few fine and very fine pores; few fine streaks of lime in lower part; calcareous; mildly alkaline; clear smooth boundary. (10 to 34 inches thick)

B22ca--32 to 40 inches; light reddish brown (5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine pores; common fine and medium soft white (N 8) $CaCO_3$ nodules; calcareous; moderately alkaline; abrupt smooth boundary. (4 to 15 inches thick)

C--40 to 60 inches; reddish yellow (5YR 7/6) very fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; calcareous; moderately alkaline.

Type Location: Quay County, New Mexico; 1,000 feet west and 120 feet south of the NE corner of sec. 10, T. 11 N., R. 30 E.

Range in Characteristics: The solum ranges from 20 to 56 inches thick. Rock fragments (gravel) in the control section range from 0 to 15 percent. Annual soil temperature ranges from 59° to 72° F. The solum ranges from mildly to moderately alkaline and from calcareous to noncalcareous.

The A horizon has hue of 5YR through 10YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4. Texture is fine sandy loam, sandy loam or loamy fine sand.

The B horizon has hue of 2.5YR through 7.5YR, value of 5 through 7 dry, 4 through 6 moist, and chroma of 3 through 6. It ranges from sandy loam to loam with less than 18 percent clay. Segregated lime in the lower B horizon ranges from a few fine streaks to common soft bodies. $CaCO_3$ equivalent ranges from 0 to 15 percent within a depth of 40 inches.

The C horizon has hue of 5YR or 7.5YR, with value of 5 through 7, and chroma of 4 through 6. Texture is fine sandy loam, sandy loam or very fine sandy loam. Some pedons have buried horizons below depth of 40 inches.

Competing Series: These are the Agustin, Los Tanos, Malstrom, McCullough, Pajarito and Vado series. Agustin soils have 15 to 35 percent rock fragments in the control section and have an aridic moisture regime. Los Tanos soils have sandstone bedrock at depths of 20 to 40 inches. McCullough soils have sola hinner than 12 inches. Pajarito and Vado soils have an aridic moisture regime. Also, Vado soils have more than 35 percent rock fragments in the control section. Malstrom soils have calcic horizons.

Geographic Setting: The Ima soils are on nearly level to moderately sloping upland plains, alluvial fans, and piedmonts. The soils formed in moderately coarse textured mixed sediments mostly from Jurassic, Triassic, Permian and Pennsylvanian formations. The climate is semiarid continental. The mean annual air temperature is about 57° to 62° F. Mean annual precipitation ranges from about 12 to about 17 inches most of which is received between June and September. The frost-free season is 180 to 210 days. Slopes are of 0 to 5 percent.

Geographically Associated Soils: These are the Los Tanos, La Lande, Montoya, and Quay soils. La Lande soils have 18 to 35 percent clay in the control section. Montoya soils have more than 35 percent clay in the control section. Quay soils have 18 to 35 percent clay in the control section and have a calcic horizon within 40 inches of the surface. In Texas the principal associated soils are Chispa, Dalby, Hodgins, McCarran, Monahans, Redona and Upton.

Drainage and Permeability: Well drained; permeability is moderately rapid.

Use and Vegetation: Principal use is rangeland. Native vegetation is mainly blue grama, sideoats grama, black grama, little bluestem, mesa dropseed, spike dropseed, sand bluestem, yucca, and occasionally sand sage.

Distribution and Extent; East-central New Mexico and western Texas. The series is of moderate extent.

Series Established: Quay County (Southwest Quay SCD), New Mexico, 1958.

National Cooperative Soil Survey
U. S. A.

NM0085

SOIL SURVEY INTERPRETATIONS

SOIL SERIES FILE

IMA SERIES

MLRA(S): 70
REV. DSP. ~~2-76~~ 9-77
USTOCHREPTIC CAMBORTHIDS, COARSE-LOAMY, MIXED, THERMIC

THE IMA SERIES CONSISTS OF DEEP, WELL DRAINED SOILS. THEY FORMED IN ALLUVIUM LARGELY FROM RED-BED FORMATIONS ON ALLUVIAL FANS AND PIEDMONT SLOPES. ELEVATION RANGES FROM 4000 TO 4600 FEET. MEAN ANNUAL PRECIPITATION IS 13 TO 16 INCHES, MEAN ANNUAL AIR TEMPERATURE IS 57 TO 62 F AND THE FROST-FREE SEASON IS 180 TO 210 DAYS. TYPICALLY THE SURFACE LAYER IS A REDDISH BROWN SANDY LOAM AND FINE SANDY LOAM ABOUT 10 INCHES THICK. THE SUBSOIL IS A LIGHT REDDISH BROWN FINE SANDY LOAM ABOUT 30 INCHES THICK AND THE SUBSTRATUM IS A REDDISH YELLOW VERY FINE SANDY LOAM. SLOPES ARE 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-10	FSL, SL, LFS	SM	A-2, A-4	0	90-100	85-100	75-100	25-50	<30	NP-5
10-40	FSL, SL	SM	A-2, A-4	0	90-100	85-100	75-100	25-50	<30	NP-5
40-60	FSL, SL, VFSL	SM, ML	A-2, A-4	0	90-100	85-100	75-100	20-55	<30	NP-5

DEPTH (IN)	CLAY (PCT OF <2MM)	MOIST BULK DENSITY (G/CM³)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (pH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
SAME DEPTH AS ABOVE	5-18	–	2.0-6.0	0.11 - 0.15	7.4-8.4	<2	LOW	.37	5	3	.2-.5	HIGH	LOW
	5-18	–	2.0-6.0	0.11 - 0.15	7.4-8.4	<2	LOW	.43					
	5-18	–	2.0-6.0	0.11 - 0.17	7.9-8.4	<2	LOW	.43					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE			>6.0			–		>60		–		B	–

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE
SANITARY LANDFILL (TRENCH)	MODERATE-SEEPAGE
SANITARY LANDFILL (AREA)	MODERATE-SEEPAGE
DAILY COVER FOR LANDFILL	FSL, SL: GOOD LFS: FAIR-TOO SANDY

SOURCE MATERIAL

ROADFILL	GOOD
SAND	POOR-EXCESS FINES
GRAVEL	UNSUITED
TOPSOIL	FSL, SL: GOOD LFS: FAIR-TOO SANDY

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

WATER MANAGEMENT

POND RESERVOIR AREA	SEEPAGE
EMBANKMENTS DIKES AND LEVEES	PIPING, SEEPAGE
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	FAVORABLE
IRRIGATION	ERODES EASILY, SEEPAGE
TERRACES AND DIVERSIONS	ERODES EASILY
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATION

CAMP AREAS	FSL,SL: SLIGHT LFS: MODERATE-TOO SANDY	PLAYGROUNDS	0-2% FSL,SL: SLIGHT 2+% FSL,SL: MODERATE-SLOPE 0-2% LFS: MODERATE-TOO SANDY 2+% LFS: MODERATE-SLOPE,TOO SANDY
PICNIC AREAS	FSL,SL: SLIGHT LFS: MODERATE-TOO SANDY	PATHS AND TRAILS	FSL,SL: SLIGHT LFS: MODERATE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		ALFALFA HAY (TONS)		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		WHEAT, WINTER (BU)		PASTURE (AUM)					
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1%	6E	2E	-	6.0	-	700	-	100	-	35						
1-3%	6E	3E	-	5.5	-	650	-	87	-	30						
3+%	6E	4E	-	4.5	-	-	-	70	-	-						

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	ARIZONA CYPRESS SIBERIAN ELM		PONDEROSA PINE		ROCKY MT. JUNIPER		RUSSIAN-OLIVE	

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
0-1% IRR	GOOD	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	GOOD	-	V. POOR	FAIR
1-3% IRR	FAIR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
3+% IRR	FAIR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
0-5% NIRR	POOR	FAIR	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: FSL,SL	LFS			
LITTLE BLUESTEM	ANSC2	20	20			
SIDEOATS GRAMA	BOCU	20	5			
NEEDLEANDTHREAD	STCO4	5	-			
NEW MEXICO FEATHERGRASS	STNE2	5	5			
BLACK GRAMA	BOER4	10	5			
WESTERN WHEATGRASS	AGSM	5	-			
BLUE GRAMA	BOGR2	10	10			
HAIRY GRAMA	BOHI2	10	10			
FRINGED SAGEWORT	ARFR4	5	-			
SAND DROPSEED	SPCR	5	10			
SMALL SOAPWEED	YUGL	5	-			
MESA DROPSEED	SPFL2	-	10			
SPIKE DROPSEED	SPCO4	-	10			
SAND BLUESTEM	ANHA	-	10			
PLAINS BRISTLEGRASS	SEMA5	-	5			
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1800	1300			
NORMAL YEARS		1000	900			
UNFAVORABLE YEARS		400	500			

FOOTNOTES

A ESTIMATES OF ENGINEERING PROPERTIES ARE BASED ON TEST DATA OF 1 PEDON FROM QUAY COUNTY, NEW MEXICO.

1 SEEPAGE IS ONLY A MODERATE LIMITATION IN SEMIARID CLIMATE.

B WINDBREAKS NEED IRRIGATION THE FIRST SEASON.

Established Series
Rev. ERB
9/73

JALMAR SERIES

The Jalmar series is a member of the loamy, mixed, thermic family of Arenic Ustalfic Haplargids. These soils have brown and reddish brown fine sand A horizons about 26 inches thick, and reddish sandy clay loam Bt horizons having an accumulation of calcium carbonate beginning at about 64 inches depth.

Typifying Pedon: Jalmar fine sand - native rangeland.
(Colors are for dry soil unless otherwise stated.)

A11 -- 0-14 inches, brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; single grained; loose, nearly loose, nonsticky; common fine roots; neutral; gradual smooth boundary. (6 to 20 inches thick)

A12 -- 14-26 inches, reddish brown (5YR 5/4) fine sand, reddish brown (5YR 4/4) moist; single grained; loose, nonsticky; common fine roots; neutral; clear smooth boundary. (8 to 24 inches thick)

B21t -- 26-52 inches, red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate coarse prismatic parting to moderate medium subangular blocky structure; very hard, firm, slightly sticky; few fine roots and pores; thin continuous clay films on peds; neutral; gradual wavy boundary. (18 to 30 inches thick)

B22t -- 52-64 inches, red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate coarse prismatic parting to moderate medium subangular blocky structure; slightly hard, friable, slightly sticky; thin patchy clay films on prisms and faces of peds; mildly alkaline; gradual wavy boundary. (8 to 20 inches thick)

B23tca -- 64-80 inches, reddish yellow (5YR 6/6) light sandy clay loam, yellowish red (5YR 5/6) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky; thin patchy clay films on peds; about 25 percent visible $CaCO_3$ in soft bodies and coatings on peds; calcareous; moderately alkaline.

Type Location: Andrews County, Texas; 75 feet east of oil field road, which is 0.8 mile north of intersection of oil field road and Florey road, this intersection being 1.8 miles east of intersection of Florey road and U.S. Highway 385, which is 10 miles north of the courthouse in Andrews, Texas.

Range in Characteristics: Thickness of the solum ranges from 60 to more than 80 inches.

The A horizon is light reddish brown (5YR 6/3, 6/4), reddish brown (5YR 5/3, 5/4), light brown (7.5YR 6/4), or brown (7.5YR 5/4). It is loamy fine sand or fine sand, and is neutral to mildly alkaline. Thickness of the A horizon varies from 20 to 40 inches.

The Bt horizon is reddish brown (2.5YR 5/4; 5YR 5/4), light reddish brown (2.5YR 6/4; 5YR 6/4), light red (2.5YR 6/6, 6/8), red (2.5YR 4/6, 5/6, 5/8), reddish yellow (5YR 6/6), or yellowish red (5YR 5/6). It is sandy clay loam with clay content of 20 to 35 percent. Reaction of the Bt ranges from neutral to mildly alkaline in the upper part and neutral to moderately alkaline in the lower part.

The Btca horizon contains 2 to 35 percent visible $CaCO_3$. In some pedons calcic horizon occurs at depths below 60 inches.

Competing Series and their Differentiae: These include the Brownfield, Kermit, Maljamar, Palomas, Patricia, Penwell, Pyote, and Triomas series. The Brownfield and Patricia soils are usually moist; and in addition, the Patricia soils have A horizons less than 20 inches thick. Kermit and Penwell soils lack Bt horizons and are sandy throughout. Maljamar and Palomas soils are dry for longer periods of time. Palomas and Triomas soils have A horizons less than 20 inches thick. Pyote soils contain less than 18 percent clay in the Bt horizon.

Setting: Jalmar soils are on plains. Slopes are dominantly less than 2 percent, but may range up to 5 percent and are undulating in some places. The regolith consists of deep moderately sandy to sandy materials that appear to be largely of eolian origin. The climate is semiarid. Annual precipitation is 13 to 17 inches, and the annual Thornthwaite P-E indices are 18 to 23. Average annual air temperature is 63° to 69° F.

Principal Associated Soils: These are Penwell, Pyote, and Triomas of the competing series and the Douro, Faskin, and Ratliff series. Douro and Faskin soils have A horizons less than 20 inches thick; and in addition, the Douro soils have petrocalcic horizons within 40 inches and the Faskin soils have calcic horizons within 60 inches. Ratliff soils lack Bt horizons and are calcareous throughout.

[illegible]nage and Permeability: Well drained; very slow surface runoff; moderate permeability.

Use and Vegetation: Used almost entirely for rangeland. Vegetation consists of mesa dropseed, little bluestem, sand bluestem, yucca, Havard oak and sand sage.

Distribution and Extent: Southwestern Texas and possibly southwestern New Mexico. The series is of moderate extent.

Series Established: Andrews County, Texas; 1970.

Remarks: These soils formerly were included in the Brownfield series, and classified in the Reddish Chestnut great soil group.

National Cooperative Soil Survey
U. S. A.

MLRA(S): 77
EB, 5-73
ARENIC USTALFIC HAPLARGIDS, LOAMY, MIXED, THERMIC

JALMAR SERIES

THE JALMAR SERIES CONSISTS OF DEEP, WELL DRAINED, MODERATELY PERMEABLE UNDULATING SOILS OF UPLANDS. THE SOIL FORMED IN SANDY EOLIAN MATERIALS. IN A REPRESENTATIVE PROFILE, THE FINE SAND SURFACE LAYER IS ABOUT 26 INCHES THICK. THE SURFACE LAYER IS BROWN IN THE UPPER 14 INCHES AND REDDISH BROWN BELOW. THE SANDY CLAY LOAM SUBSOIL EXTENDS TO DEPTHS GREATER THAN 80 INCHES. THE SUBSOIL IS RED IN THE UPPER 38 INCHES AND REDDISH YELLOW BELOW 64 INCHES. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-26	FS, LFS	SM, SP-SM, SM-SC	A-2-4	0	100	98-100	95-100	5-25	<24	NP-4
26-80	SCL	SC, SM-SC	A-2-4, A-2-6, A-6, A-4	0	100	98-100	95-100	25-45	20-35	7-18

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-26	6.0-20	0.03-0.08	6.6-7.8	-	VERY LOW	LOW	LOW	.10	5	1
26-80	0.6-2.0	0.12-0.18	6.6-8.4	-	LOW	MODERATE	LOW	.24		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6			-		>60		-		A	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE
SANITARY LANDFILL (TRENCH)	MODERATE-TOO SANDY
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-TOO SANDY

COMMUNITY DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (B)

ROADFILL	GOOD
SAND	POOR-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-SEEPAGE,PIPING
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ERODES EASILY,FAST INTAKE
TERRACES AND DIVERSIONS	TOO SANDY
GRASSED WATERWAYS	ERODES EASILY,DROUGHTY

RECREATION (C)

CAMP AREAS	SEVERE-TOO SANDY	PLAYGROUNDS	SEVERE-TOO SANDY
PICNIC AREAS	SEVERE-TOO SANDY	PATHS AND TRAILS	SEVERE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY NIRR	CAPABILITY IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	6E	-														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (E)

COMMON PLANT NAME	PLANT SYMBOL (NSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE SANDY				
SAND BLUESTEM	ANHA	15				
GIANT DROPSEED	SPGI	15				
SPIKE DROPSEED	SPCO4	10				
LITTLE BLUESTEM	ANSC2	10				
CANE BLUESTEM	ANBA	5				
SAND DROPSEED	SPCR	5				
FALL WITCHGRASS	LECO	5				
MESA DROPSEED	SPFL2	5				
HAVARD PANICUM	PAHA2	10				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER SHRUBS	SSSS	10				
OTHER ANNUAL GRASSES	AAGG	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2400				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		800				

FOOTNOTES

A RATINGS BASED ON ENGINEERING TEST DATA OF 1 PEDON FROM ANDREWS COUNTY, TEXAS.
B RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS," NOV. 1971
C RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
[illegible] RANGE SITE
RATINGS BASED ON SRWPC COMMITTEE IV GUIDE, DRAFT APR. 1970.

SOIL [illegible]

Established Series
Rev. OFB-HJM-VGL
3/72

KIMBROUGH SERIES

The Kimbrough series is a member of the loamy, mixed, thermic, shallow family of Petrocalcic Calciustolls. Typically, Kimbrough soils have dark grayish brown gravelly loam A horizons and an indurated horizon at a depth of about 8 inches.

Typifying Pedon: Kimbrough gravelly loam - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 0-8"--Dark grayish brown (10YR 4/2) gravelly loam; very dark grayish brown (10YR 3/2) moist; weak thin platy structure in the upper one or two inches, weak granular and subangular blocky structure in the lower part; slightly hard, friable, slightly sticky; many fine and medium roots, many fine pores; about 15 percent of the surface is covered with hard lime fragments; about 30 percent by volume of hard lime fragments and gravel; calcareous below 1 to 3 inches; mildly alkaline; abrupt smooth boundary. (4 to 20 inches thick)

Ccam 8-36"--White (N 8/) indurated layer containing a few fractures; laminar in upper part and pisolitic structure below the laminae; becomes softer below the pisolitic layer; several to many feet thick.

Type Location: Lea County, New Mexico; about 1,000 feet north and 1,000 feet west of the south quarter corner of sec. 30, T.16S., R.37E.

Range in Characteristics: The depth to the Ccam horizon ranges from 4 to 20 inches. The soil contains 10 to 35 percent gravel throughout. The control section is loam, gravelly loam or gravelly fine sandy loam. The A horizon has hue of 7.5YR or 10YR, value of 3 through 5 dry and 2 or 3 moist, and chroma of 2 through 4. It is mildly to moderately alkaline. The Ccam horizon ranges from fractured, indurated, and thinly laminar to continuously indurated, thickly laminar and has none to several feet of pisolitic structure below the laminar.

Competing Series and their Differentiae: These are the Cho, Espy, Pitzer, and Queeny series. Cho, Pitzer and Queeny soils are moist for longer periods—have ustic moisture regimes. Espy soils lack mollic epipedons resting directly on petrocalcic horizons.

Setting: The Kimbrough soils are on level to gently sloping plains having a thin mantle of medium to moderately coarse textured material over an indurated layer. Shallow depressions are common features of the landscape. The average annual precipitation ranges from 10 to about 17 inches. The average annual temperature ranges from 57° to 75° 66 F. Thornthwaite P-E Index ranges from 16 to 40.

Principal Associated Soils: These are the Ector, Lea, Sharvana, Simona, Slaughter, Stegal and Upton soils. Ector soils are very shallow to shallow over hard limestone. Lea soils have petrocalcic horizons at depths of more than 20 inches. Sharvana, Simona, and Upton soils lack mollic epipedons. Sharvana, Slaughter and Stegal soils have argillic horizons.

Drainage and Permeability: Well-drained; slow to medium runoff; moderate permeability.

Use and Vegetation: The Kimbrough soils are used nearly exclusively for rangeland. In the cooler part of the series range native vegetation is blue grama, hairy grama, sideoats grama, black grama, and widely spaced mesquite, snakeweed, and yucca; and in the warmer part of the range red grama, buffalo grass, curly mesquite and Guajillo, silver leaf and leatherstem.

Distribution and Extent: Southeastern New Mexico, southeastern Arizona, and southern and western Texas. The series is extensive.

Series Established: Lea County, New Mexico (Reconnaissance Survey of Eastern New Mexico), 1936.

Remarks: The Kimbrough soils were formerly classified as Lithosols.

National Cooperative Soil Survey
U. S. A.

MLRA(S): 40, 41
JJ. ~~[illegible]~~ GWA, 7-77
PETROCALCIC CALCIUSTOLLS, LOAMY, MIXED, THERMIC, SHALLOW

SOIL SERIES FILE

KIMBROUGH SERIES

THE KIMBROUGH SERIES CONSISTS OF SHALLOW WELL-DRAINED SOILS. THEY FORMED IN WINDLAID SEDIMENTS ON UPLAND PLAINS. ELEVATIONS RANGE FROM 2000 TO 5000 FEET. MAP IS 12 TO 17 INCHES. MAT IS 57 TO 70 DEGREES F. FFP IS 175 TO 215 DAYS. TYPICALLY, THESE SOILS HAVE BROWN GRAVELLY FINE SANDY LOAM SURFACE LAYERS AND BROWN GRAVELLY LOAM IN THE LOWER PART OF THE SURFACE LAYER. LIME CEMENTED BEDROCK OCCURS AT A DEPTH OF 14 INCHES. SLOPES ARE 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-3	GR-L, GR-FSL	GM, ML, CL-ML, GM-GC	A-2, A-4, A-1	0-10	55-80	50-75	35-70	20-55	15-30	NP-10
3-14	GR-L	GM, ML, CL-ML, GM-GC	A-2, A-4	0-10	55-80	50-75	40-70	30-55	20-30	NP-10
14	IND									

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-3	15-20	1.35-1.55	0.6-2.0	0.11-0.15	7.4-8.4	<2	LOW	.28	1	5	-	MODERATE	LOW
3-14	15-20	1.35-1.55	0.6-2.0	0.16-0.18	7.4-8.4	<2	LOW	.32					
14													

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			4-20	HARD	>60		-		D	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-CEMENTED PAN
SEWAGE LAGOON AREAS	SEVERE-CEMENTED PAN
SANITARY LANDFILL (TRENCH)	SEVERE-CEMENTED PAN
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	POOR-THIN LAYER, AREA RECLAIM

CONSTRUCTION MATERIAL

ROADFILL	POOR-AREA RECLAIM, THIN LAYER
SAND	UNSUITED-~~THIN LAYER~~
GRAVEL	UNSUITED-~~THIN LAYER~~
TOPSOIL	POOR-AREA RECLAIM, SMALL STONES

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CEMENTED PAN
DWELLINGS WITHOUT BASEMENTS	SEVERE-CEMENTED PAN
DWELLINGS WITH BASEMENTS	SEVERE-CEMENTED PAN
SMALL COMMERCIAL BUILDINGS	SEVERE-CEMENTED PAN
LOCAL ROADS AND STREETS	SEVERE-CEMENTED PAN
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

WATER MANAGEMENT

POND RESERVOIR AREA	~~CEMENTED PAN~~ DEPTH TO PAN
EMBANKMENTS DIKES AND LEVEES	THIN LAYER, PIPING
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	CEMENTED PAN
IRRIGATION	DROUGHTY, ROOTING DEPTH
TERRACES AND DIVERSIONS	CEMENTED PAN
GRASSED WATERWAYS	DROUGHTY, ROOTING DEPTH, CEMENTED PAN

REGIONAL INTERPRETATIONS

IMBROUGH SERIES NM0337

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-SMALL STONES	PLAYGROUNDS	SEVERE-CEMENTED PAN,SMALL STONES ~~SEVERE-CEMENTED PAN,SLOPE,SMALL STONES~~
NIC AREAS	MODERATE-SMALL STONES	PATHS AND TRAILS	MODERATE-SMALL STONES

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	7S															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	V. POOR	V. POOR	FAIR	-	-	FAIR	V. POOR	V. POOR	V. POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: 7-12" PPT	12-16" PPT			
USH MUHLY	MUPO2	30	-			
LACK GRAMA	BOER4	10	20			
ROPSEED	SPORO	10	-			
LAINS BRISTLEGRASS	SEMA5	10	-			
IDEOATS GRAMA	BOCU	5	20			
HREEAWN	ARIST	10	10			
LIM TRIDENS	TRMU	10	-			
R ENS	TRIDE	-	10			
LUFFGRASS	TRPU2	5	5			
AIRY GRAMA	BOHI2	-	10			
ANE BLUESTEM	ANBA	-	10			
ALSE-MESQUITE	CAER	-	5			
ARICLA	PAIN2	5	-			
EABUSH	DALEA	-	5			
THER PERENNIAL FORBS	PPFF	5	5			
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		700	1200			
NORMAL YEARS		400	800			
UNFAVORABLE YEARS		200	500			

FOOTNOTES

Established Series
Rev. VGL-HJM
6-68

LA LANDE SERIES

The La Lande series is a member of the fine-loamy, mixed, thermic family of Ustollic Camborthids. They have reddish brown loam A horizons, reddish brown calcareous loam B horizons, and light reddish brown calcareous loam C horizons.

Typifying Pedon: La Lande loam - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 -- 0-4" -- Reddish brown (5YR 5/4) light loam, dark reddish brown (5YR 3/4) moist; weak very fine granular structure and weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; many fine roots; many very fine pores; mildly alkaline; clear smooth boundary. (3 to 7 inches thick.)

B1 -- 4-9" -- Reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky; many fine roots; many very fine and fine pores; few clusters of fine worm casts; mildly alkaline; gradual smooth boundary. (3 to 6 inches thick.)

B2 -- 9-17" -- Reddish brown (5YR 5/4) heavy loam, (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky; many fine roots; many very fine and fine pores; common clusters of fine worm casts; few fine pebbles; few patches of powdery lime and thin lime coatings on undersides of pebbles; calcareous, moderately alkaline; gradual smooth boundary. (7 to 15 inches thick.)

B3ca -- 17-24" -- Light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky; common fine roots; many very fine, few fine pores; few clusters of fine worm casts; few fine pebbles; common fine and medium soft bodies of lime and thin coatings on pebbles; calcareous, moderately alkaline; gradual smooth boundary. (7 to 12 inches thick.)

Cca -- 24-50" -- Light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure grading to massive in the lower part; hard, friable, slightly sticky; few fine roots; common very fine and fine pores; few fine pebbles; common fine and medium soft bodies of lime and thin coatings on pebbles, amount of lime decreases as depth increases; calcareous, moderately alkaline.

Type Location: Guadalupe County, New Mexico; 30 feet east of road NE$\frac{1}{4}$NE$\frac{1}{4}$, sec. 11, T. 8 N., R. 26 E.

Range in Characteristics: Thickness of the solum ranges from 20 to 40 inches. Mineralogy is mixed. The mean annual soil temperature ranges from 59° to 72° F. These soils are usually dry between 7 and 20 inches but are not dry in all parts above 12 inches more than half the time the soil temperature is higher than 41° F. The driest periods are in the fall and spring. The A horizon ranges in hue from 2.5YR through 7.5YR, value is 5 or 6 dry and 3 or 4 moist, and chroma is 3.5 to 4.5. The A horizon and upper part of the B horizon ranges from noncalcareous to weakly calcareous. The B horizon ranges in hue from 2.5YR through 7.5YR, in value from 5 through 7 dry and 3 through 5 moist, and in chroma from 4 through 6. The control section is loam, sandy clay loam, or clay loam containing between 18 and 35 percent clay. It contains less than 15 percent coarse fragments. The B horizon ranges in structure from weak coarse prismatic to weak and moderate fine to medium subangular blocky. Calcium carbonate content of the lower part of the B horizon and the C horizon ranges from 1 to 15 percent. The lime is disseminated or in common fine and medium soft bodies.

Competing Series and their Differentiae: These are Alama, Delano, Ima, La Fonda, and Milham series. Alama soils have more than 15 percent fine and coarser sand in the control section. The Delano series has a structureless, massive cambic horizon and a loamy coarse sand, weakly to strongly cemented C horizon. The Delano and Milham soils both have marked winter maximums of precipitation and nearly rainless summers. The Milham soils, in addition, have an abundance of calcium carbonate nodules and many iron stains in the B horizon and C horizons of loose permeable stratified sand and gravel having an upper boundary within 40 inches of the surface. The Ima soils contain less than 18 percent clay in the control section. La Fonda soils have annual soil temperatures ranging from 47° to 59° F.

Setting: The La Lande soil is on nearly level to moderately sloping alluvial fans and piedmont slopes. They formed in medium and moderately fine-textured calcareous mixed sediments derived principally from "redbed" formations of Jurassic, Triassic, Permian, and Pennsylvanian age. The climate is semiarid, continental. Near the type location, the average annual precipitation is about 14 inches with a marked summer maximum characterized by heavy thunderstorms of short duration. The mean annual temperature is 61° F.

Principal Associated Soils: These are the competing Alama soils and the Hassell, Montoya, Quay, and Tucumcari soils. The Hassell and Tucumcari soils have argillic horizons. The Montoya soils contain more than 35 percent clay in the control section. The Quay soils have calcic horizons within 40 inches of the surface.

Drainage and Permeability: Well drained; runoff is medium, and permeability is moderate.

Use and Vegetation: Principal use is rangeland but where water is available these soils are used for irrigated cropland. Native vegetation is primarily blue grama, black grama, bush muhly, and galleta, with some cholla and yucca.

Distribution and Extent: East central New Mexico. It is of moderate extent.

Series Established: Southwest Quay Area, New Mexico, 1958.

Remarks: The La Lande series was formerly classified in the Reddish Chestnut great soil group.

National Cooperative Soil Survey
U.S.A.

MLRA(S): 70
SCS, TCH 8-76 CWA, 7-77
USTOLLIC CAMBORTHIDS, FINE-LOAMY, MIXED, THERMIC

THE LA LANDE SERIES CONSISTS OF DEEP WELL DRAINED SOILS. THEY FORMED IN MEDIUM TO MODERATELY FINE-TEXTURED CALCAREOUS MIXED SEDIMENTS DERIVED FROM REDBED FORMATIONS ON NEARLY LEVEL TO MODERATELY SLOPING ALLUVIAL FANS AND PIEDMONT SLOPES. ELEVATION IS 3800 TO 5300 FEET. MEAN ANNUAL PRECIPITATION IS 13 TO 16 INCHES AND AVERAGE ANNUAL AIR-TEMPERATURE IS 61 F. FROST FREE SEASON IS 180 TO 195 DAYS. TYPICALLY THE SURFACE AND SUBSURFACE LAYERS ARE A LOAM ABOUT 9 INCHES THICK. THE SUBSOIL IS LOAM, SANDY CLAY LOAM OR CLAY LOAM. THE UNDERLYING MATERIAL IS LOAM. SLOPES ARE 0 TO 8 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

H (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-9	L, FSL, SL	SM, ML	A-4	0	100	100	90-100	35-75	-	NP
9-24	L, SCL, CL	CL-ML, CL	A-4, A-6	0	100	100	85-95	55-75	25-35	5-15
24-60	L, SCL	CL-ML, CL	A-4	0	100	100	85-95	50-60	20-30	5-10

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-9	10-25	-	0.6-2.0	0.11-0.18	7.4-8.4	<2	LOW	.37	5	5	.5-1	HIGH	LOW
9-24	18-35	-	0.6-2.0	0.14-0.21	7.9-8.4	<2	MODERATE	.32					
24-60	18-30	-	0.6-2.0	0.14-0.18	7.9-8.4	<2	LOW	.32					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE, SLOPE 7+%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	MODERATE-SHRINK-SWELL, LOW STRENGTH
DWELLINGS WITH BASEMENTS	MODERATE-SHRINK-SWELL, LOW STRENGTH
SMALL COMMERCIAL BUILDINGS	0-4%: MODERATE-SHRINK-SWELL, LOW STRENGTH 4+%: MODERATE-SHRINK-SWELL, SLOPE, LOW STRENGTH
LOCAL ROADS AND STREETS	MODERATE-SHRINK-SWELL, LOW STRENGTH
LAWNS, NDSCAPING AND GOLF FAIRWAYS	SLIGHT

REGIONAL INTERPRETATIONS

CONSTRUCTION MATERIAL

ROADFILL	FAIR-LOW STRENGTH, SHRINK-SWELL
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-TOO CLAYEY

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SLOPE, SEEPAGE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH, THIN LAYER
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	0-1%: FAVORABLE 1+%: SLOPE
IRRIGATION	0-1%: FAVORABLE 1+%: SLOPE, ERODES EASILY
TERRACES AND DIVERSIONS	FAVORABLE
GRASSED WATERWAYS	

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-DUSTY	PLAYGROUNDS	0-2X: MODERATE-DUSTY 2-6X: MODERATE-DUSTY,SLOPE 6+X: SEVERE-SLOPE
PICNIC AREAS	MODERATE-DUSTY	PATHS AND TRAILS	MODERATE-DUSTY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		ALFALFA HAY (TONS)		GRAIN SORGHUM (BU)		WHEAT (BU)		COTTON LINT (LBS)		PASTURE (AUM)					
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1X L	6E	2E		7.5		135		65		900		13				
1-3X L	6E	2E		6.0		110		50		650		11				
3-5X L	6E	3E		5.0		-		-		-		9				
0-1X FSL,SL	6E	2E		7.0		125		50		800		12				
1-3X FSL,SL	6E	3E		6.0		100		40		600		11				
3-5X FSL,SL	6E	4E														
5+X L	6E	4E														
5+X FSL,SL	6E															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
0-1X IRR	GOOD	GOOD	GOOD	-	-	GOOD	GOOD	GOOD	GOOD	-	GOOD	-
1-3X IRR	FAIR	GOOD	GOOD	-	-	GOOD	GOOD	POOR	GOOD	-	FAIR	-
3+X IRR	FAIR	GOOD	GOOD	-	-	GOOD	POOR	V. POOR	GOOD	-	V. POOR	-
NIRR	POOR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: L	FSL,SL			
BLUE GRAMA	BOGR2	45	20			
GALLETA	HIJA	15	-			
BLACK GRAMA	BOER4	5	15			
SIDEOATS GRAMA	BOCU	5	10			
LITTLE BLUESTEM	ANSC2	-	20			
SAND MUHLY	MUAR2	5	-			
THREEAWN	ARIST	5	-			
BROOM SNAKEWEED 1/	GUSA2	5	-			
OTHER PERENNIAL FORBS	PPFF	5	5			
OTHER ANNUAL FORBS	AAFF	5	5			
OTHER PERENNIAL GRASSES	PPGG	5	5			
SAND DROPSEED	SPCR	-	10			
FRINGED SAGEWORT	ARFR4	-	5			
YUCCA	YUCCA	-	5			
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		1200	1600			
NORMAL YEARS		650	850			
UNFAVORABLE YEARS		200	400			

FOOTNOTES

* ESTIMATES OF ENGINEERING PROPERTIES ARE BASED ON 1 PEDON FROM QUAY COUNTY, NEW MEXICO.

1 NOT USUALLY UTILIZED BY CATTLE AND SHEEP.

Established Series
Rev. MVH/BDS
2/74

MALSTROM SERIES

The Malstrom series is a member of the coarse-loamy, mixed, thermic family of Ustochreptic Calciorthids. Typically, Malstrom soils have noncalcareous light brown loamy fine sand A horizons and noncalcareous brown loamy fine sand B horizons over loamy fine sand, loam, and fine sandy loam C horizons high in lime.

Typifying Pedon: Malstrom loamy fine sand - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 0-6"--Light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; loose; many fine roots; many very fine interstitial pores; mildly alkaline; abrupt smooth boundary. (3 to 7 inches thick)

B 6-19"--Brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable; many very fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary. (13 to 15 inches thick)

C1 19-25"--Light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable; common very fine roots; many very fine interstitial pores; few lime filaments and few soft masses of lime; strongly calcareous; moderately alkaline; abrupt wavy boundary. (4 to 8 inches thick)

C2ca 25-53"--Very pale brown (10YR 8/3) loam, very pale brown (10YR 7/3) moist; massive; hard, very friable, slightly sticky, slightly plastic; many very fine tubular pores; disseminated lime and few lime filaments; strongly calcareous; strongly alkaline; clear wavy boundary. (10 to 30 inches thick)

C3ca 53-60"--Very pale brown (10YR 8/3) fine sandy loam, very pale brown (10YR 7/3) moist; massive; very friable, slightly sticky, slightly plastic; few caliche pebbles; strongly calcareous; strongly alkaline.

Type Location: Chaves County, New Mexico; about 48 miles southeast of Roswell; 51 feet north of old road and .9 mile west of windmill in the NW1/4 sec. 2, T.13S., R.30E.

Range in Characteristics: The depth to the Cca horizon is 20 to 30 inches. The A horizon has hue of 7.5YR or 10YR dry and moist, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4 dry and moist. The B horizon has hue of 7.5YR or 10YR dry and moist, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4 dry and moist. It is loamy fine sand or fine sandy loam. This horizon has weak fine subangular blocky structure or is massive. The C1 horizon has hue of 7.5YR or 10YR dry and moist, value of 6 or 7 dry, 5 or 6 moist, and chroma of 3 or 4 dry and moist. It is loamy fine sand or fine sandy loam. This horizon has 5 to 20 percent calcium carbonate equivalent. The C2ca horizon has hue of 10YR or 7.5YR dry and moist, value of 7 or 8 dry, 6 or 7 moist, and chroma of 1 through 4 dry and moist. It is loam or fine sandy loam. This horizon has 25 to 40 percent calcium carbonate equivalent. In some pedons it is weakly cemented. The C3ca horizon has hue of 10YR through 5YR dry and moist, value of 7 or 8 dry, 6 or 7 moist, and chroma of 2 through 4 dry and moist. It is fine sandy loam or loam. This horizon has 15 to 30 percent calcium carbonate equivalent. Some pedons contain a few caliche pebbles and strata of loamy fine sand and fine sand below the C2ca horizon.

Competing Series and their Differentiae: These are the Agustin, Ima, Jal, Kinco, Los Tanos, Monahans, and Pajarito series. Agustin, Ima, and Pajarito soils lack calcic horizons. Also, Pajarito soils are dry in all parts of the moisture control section more than three quarters of the time, cumulative, that the soil temperature exceeds 41°F. Monahans soils have calcareous A horizons and have C horizons containing both carbonate and gypsum.

Setting: These soils are on level to nearly level uplands at elevations of 3500 to 4200 feet. Slopes are dominantly 0 to 3 percent. The soils formed in coarse and medium textured eolian and alluvial sediments. The climate is semiarid with mean annual precipitation of 12 to 13 inches. The driest period occurs between late September and May. The mean annual soil temperature is 59° to 61°F.

Principal Associated Soils: These are the Faskin, Jalmar, and Roswell soils. Faskin soils have an argillic horizon. Jalmar soils have a loamy fine sand A horizon thicker than 20 inches and have an argillic horizon. Roswell soils have a fine sand pedon to depth of 40 inches or more.

Drainage and Permeability: Well-drained; very slow runoff; moderately rapid permeability.

Use and Vegetation: Grazing and wildlife. Vegetation is mainly threeawn, sand dropseed, black and blue grama, little bluestem, spike dropseed, sandbur, yucca, shinnery oak, sand sagebrush, and mesquite.

Distribution and Extent: Southeastern New Mexico. The series is inextensive.

Series Established: Chaves County, Southern Part, New Mexico, 1974.

Remarks: Malstrom soils were formerly classified as Calcisols.

National Cooperative Soil Survey
U. S. A.

NM0119

SOIL SURVEY INTERPRETATIONS

MLRA(S): 42
MVH,CMC. 12-73
USTOCHREPTIC CAMBORTHIDS, COARSE-LOAMY, MIXED, THERMIC

MALSTROM SERIES

THE MALSTROM SERIES CONSISTS OF MODERATELY DEEP, TO A HIGH LIME LAYER, WELL DRAINED SOILS. THEY FORMED IN AEOLIAN AND ALLUVIAL SEDIMENTS ON UPLANDS. SLOPES ARE 0 TO 3 PERCENT. ELEVATION RANGES FROM 3500 TO 4200 FEET. MEAN ANNUAL PRECIPITATION IS 12 TO 13 INCHES. MEAN ANNUAL SOIL TEMPERATURE IS 59 TO 61 F AND FROST-FREE SEASON IS 190 TO 205 DAYS. TYPICALLY THE SURFACE AND SUBSOIL ARE LOAMY FINE SAND ABOUT 19 INCHES AND ARE NONCALCAREOUS. THE SUBSTRATUM IS LOAMY FINE SAND LOAM AND FINE SANDY LOAM HIGH IN LIME.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-25	LFS	SM	A-2	0	100	100	70-90	25-35	-	NP
0-25	FSL	SM, ML	A-4	0	100	100	75-95	40-55	<30	NP-5
25-60	L, FSL	SM, SM-SC, CL	A-2, A-4	0	95-100	90-100	65-85	25-55	<30	NP-10

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-25	6.0-20	0.08-0.10	7.4-8.4	<2	LOW	HIGH	LOW	.20	3	2
0-25	2.0-6.0	0.10-0.14	7.4-8.4	<2	LOW	HIGH	LOW	.28	3	3
25-60	2.0-6.0	0.10-0.14	8.5-9.0	2-4	LOW	HIGH	LOW	.28		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	LFS: FAIR-TOO SANDY,AREA RECLAIM FSL: FAIR-AREA RECLAIM

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL

ROADFILL	GOOD
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	LFS: POOR-TOO SANDY FSL: FAIR-AREA RECLAIM,EXCESS LIME

WATER MANAGEMENT

POND RESERVOIR AREA	SEEPAGE
EMBANKMENTS DIKES AND LEVEES	ERODES EASILY,PIPING
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	
IRRIGATION	
TERRACES AND DIVERSIONS	ERODES EASILY,PIPING
GRASSED WATERWAYS	

RECREATION

CAMP AREAS	LFS: MODERATE-TOO SANDY,SOIL BLOWING FSL: SLIGHT	PLAYGROUNDS	LFS: MODERATE-TOO SANDY,SOIL BLOWING 0-2% FSL: SLIGHT 2+% FSL: MODERATE-SLOPE
PICNIC AREAS	LFS: MODERATE-TOO SANDY,SOIL BLOWING FSL: SLIGHT	PATHS AND TRAILS	LFS: MODERATE-TOO SANDY,SOIL BLOWING FSL: SLIGHT

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	6E	-														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL NIRR	POOR	POOR	FAIR	-	-	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
SAND BLUESTEM	ANHA	20				
LITTLE BLUESTEM	ANSC2	10				
INDIANGRASS	SONU2	5				
SIDEOATS GRAMA	BOCU	10				
HALL'S PANICUM	PAHA	5				
HAIRY GRAMA	BOHI2	5				
PLAINS BRISTLEGRASS	SEMA5	5				
SHINNERY OAK 2/	QUHA3	17				
SMALL SOAPWEED	YUGL	3				
SAND DROPSEED	SPCR	5				
OTHER PERENNIAL FORBS	PPFF	5				
OTHER ANNUAL FORBS	AAFF	5				
OTHER ANNUAL GRASSES	AAGG	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1800				
NORMAL YEARS		1300				
UNFAVORABLE YEARS		1000				

FOOTNOTES

2 NOT USUALLY UTILIZED BY CATTLE AND SHEEP.

1 MOVEMENT OF LEACHATE IS NOT A LIMITATION IN THIS SEMIARID CLIMATE, GROUND WATER IS OVER 100 FEET DEEP.

Established Series
Rev. LHG/JBC
2/77

PAJARITO SERIES

The Pajarito series consists of deep, well drained soils that formed in sandy to moderately sandy sediments from mixed sources. Pajarito soils are on upland plains and alluvial fans and have slopes of 1 to 8 percent. The average annual precipitation is about 9 inches and the mean annual air temperature is about 61°F.

Taxonomic Class: Coarse-loamy, mixed, thermic Typic Camborthids.

Typical Pedon: Pajarito loamy fine sand - rangeland. (Colors are for dry soil unless otherwise noted.)

A1--0 to 5 inches; yellowish red (5YR 4/6) loamy fine sand, dark reddish brown (5YR 3/4) moist; weak fine granular structure; soft, very friable; few fine roots; very porous; slightly calcareous, lime disseminated; mildly alkaline; clear smooth boundary. (4 to 12 inches thick)

B2--5 to 18 inches; yellowish red (5YR 5/6) light fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse and medium subangular blocky structure; soft, very friable; common very fine and fine roots; common very fine and fine pores; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary. (10 to 24 inches thick)

C1ca--18 to 40 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine and fine pores; strongly calcareous, lime disseminated and segregated into few faint lime seams; moderately alkaline; gradual smooth boundary. (15 to 30 inches thick)

C2--40 to 60 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine pores; strongly calcareous, lime disseminated; moderately alkaline.

Type Location: Eddy County, New Mexico; 400 feet southeast of NW corner sec. 16, T.21S., R.31E.

Range in Characteristics: The solum ranges from 14 to more than 40 inches thick. Average annual soil temperature ranges from 59° to 71°F. These soils are dry in all parts of the moisture control section more than 1/2 of the time the soil temperature exceeds 41°F. at depth of 20 inches. Calcium carbonate equivalent is about 5 to 15 percent within a depth of 40 inches. Gravel content is 0 to 15 percent. The solum ranges from neutral to moderately alkaline.

The A horizon has hue of 7.5YR through 2.5YR, value of 4 through 6, 3 through 5 moist, and chroma of 2 through 6 dry and moist. It is loamy fine sand to fine sandy loam.

The B horizon has hue of 7.5YR through 2.5YR, value of 4 through 6, 3 through 5 moist and chroma of 2 through 6 dry, 2 through 6 moist.

The B2 and C horizons range from loamy very fine sand (more than 15 percent coarser than very fine sand) and coarse sandy loam to fine sandy loam and loam and averages less than 18 percent clay.

Competing Series: These are the Agustin, McCullough, Mobeetie, Monahans, and Vado series. Agustin soils contain 15 to 35 percent gravel in the control section. McCullough soils are strongly calcareous in the A1 horizon and have sola thinner than 12 inches. Mobeetie soils are usually moist. Monahans soils have gypsum in the substratum. Vado soils have more than 35 percent rock fragments in the control section.

Geographic Setting: The Pajarito soils are on nearly level to moderately sloping upland plains and alluvial fans, mostly on convex slopes of 1 to 8 percent, but dominantly 1 to 3 percent. The soils formed in sandy to moderately sandy mixed sediments from a variety of sources. Elevations range from 3800 to 5700 feet. The climate is arid to semiarid continental. The average annual precipitation ranges from about 6 to 12 inches with a marked summer maximum. The Thornthwaite PE Index ranges from about 10 to 24. At the type location the mean annual temperature is about 59° to 71°F.

Geographically Associated Soils: These are the Berino, Bluepoint, Dona Ana, Largo, and Nickel soils. Berino and Dona Ana soils have argillic horizons. Bluepoint soils lack cambic horizons and are sandy throughout. Largo soils lack cambic horizons and are fine-silty. Nickel soils are very gravelly and have a calcic horizon within a depth of 40 inches.

Drainage and Permeability: Well-drained; very slow runoff; moderately rapid permeability.

Use and Vegetation: Used entirely for rangeland. Native vegetation is principally grama, dropseed, and muhly grasses with some yucca, sand sagebrush, and scrub mesquite.

Distribution and Extent: Mainly in southeastern and south-central New Mexico and adjacent areas of Texas. The series is extensive.

Series Established: Deaf Smith County, Texas, 1941.

National Cooperative Soil Survey
U.S.A.

NM0015 SOIL SURVEY INTERPRETATIONS

MLRA(S): 42
DSP, 2-73
TYPIC CAMBORTHIDS, COARSE-LOAMY, MIXED, THERMIC

PAJARITO SERIES

THE PAJARITO SERIES CONSISTS OF DEEP WELL DRAINED SOILS. THEY FORMED IN ALLUVIAL SEDIMENTS ON ALLUVIAL FANS AND UPLAND PLAINS. SLOPES ARE 0 TO 5 PERCENT. ELEVATIONS RANGE FROM 3000 TO 5500 FEET. MEAN ANNUAL PRECIPITATION IS 7 TO 15 INCHES, MEAN ANNUAL AIR TEMPERATURE IS 57 TO 64F, AND THE FROST FREE SEASON IS 170 TO 220 DAYS. TYPICALLY THE SURFACE LAYER IS A YELLOWISH RED LOAMY FINE SAND ABOUT 5 INCHES THICK, THE SUBSOIL IS A YELLOWISH RED FINE SANDY LOAM ABOUT 13 INCHES THICK, AND THE SUBSTRATUM IS A YELLOWISH RED AND REDDISH YELLOW FINE SANDY LOAM.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-5	LFS	SM	A-2	-	100	100	85-100	25-35	NP	NP
0-5	FSL	SM	A-2, A-4	-	100	100	85-100	30-45	NP	NP
5-40	FSL, SL	SM	A-2, A-4	-	90-100	85-100	60-100	30-45	NP	NP
40-60	FSL, SL, L	SM, CL-ML	A-4	-	90-100	85-100	60-95	35-55	20-25	NP-7

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-5	2.0-6.0	0.09-0.11	7.4-8.4	-	LOW	HIGH	LOW	.17	5	2
0-5	2.0-6.0	0.13-0.15	7.4-8.4	-	LOW	HIGH	LOW	.24	5	3
5-40	2.0-6.0	0.13-0.15	7.9-8.4	-	LOW	HIGH	LOW	.24	-	-
40-60	2.0-6.0	0.13-0.15	7.9-8.4	-	LOW	HIGH	LOW	.24		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOONS	SEVERE-SEEPAGE
SANITARY LANDFILL (TRENCH) 1	MODERATE-SEEPAGE
SANITARY LANDFILL (AREA) 1	MODERATE-SEEPAGE
DAILY COVER FOR LANDFILL	GOOD

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4+%: MODERATE-SLOPE
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL

ROADFILL	GOOD
SAND	POOR
GRAVEL	UNSUITED
TOPSOIL	FSL: GOOD LFS: FAIR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEEPAGE,PIPING
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	FAVORABLE
IRRIGATION	ERODES EASILY,COMPLEX SLOPE
TERRACES AND DIVERSIONS	ERODES EASILY,POOR OUTLETS
GRASSED WATERWAYS	ERODES EASILY

RECREATION

CAMP AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY	PLAYGROUNDS	0-2% FSL: SLIGHT 2+% FSL: MODERATE-SLOPE 0-2% LFS: MODERATE-TOO SANDY 2+% LFS: MODERATE-SLOPE,TOO SANDY
PICNIC AREAS	FSL: SLIGHT LFS: MODERATE-TOO SANDY	PATHS AND TRAILS	FSL: SLIGHT LFS: MODERATE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-3%	7E	2E	-	1200	-	8										
3-5%	7E	3E	-		-											

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORTLY.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL, IRR	ARIZONA CYPRESS	28						

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL, NIRR	V. POOR	V. POOR	POOR	-	-	POOR	POOR	V. POOR	POOR	-	V. POOR	POOR
0-3% IRR	GOOD	GOOD	POOR	-	-	POOR	POOR	V. POOR	FAIR	-	V. POOR	POOR
3+% IRR	FAIR	GOOD	POOR	-	-	POOR	POOR	V. POOR	FAIR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: FSL	LFS	LFSHUMMOCKY		
BLACK GRAMA	BOER4	20	30	20		
BUSH MUHLY	MUPO2	15	10	10		
INDIAN RICEGRASS	ORHY	5	10	20		
SPIKE DROPSEED	SPCO4	-	3	5		
SIDE-OATS GRAMA	BOCU	5	5	5		
SAND DROPSEED	SPCR	10	15	10		
GIANT DROPSEED	SPGI	-	-	10		
PLAINS BRISTLEGRASS	SEMA5	-	-	5		
BLUE GRAMA	BOGR2	10	2	-		
THREE-AWN 2/	ARIST	10	5	-		
MESQUITE 2/	PRJU	-	3	5		
GALLETA	HIJA	10	5	-		
BROOM SNAKEWEED 2/	GUSA2	5	2	-		
SAND SAGEBRUSH 3/	ARFI2	-	5	5		
OTHER PERENNIAL FORBS	PPFF	10	5	5		
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		600	1000	925		
NORMAL YEARS		375	650	600		
UNFAVORABLE YEARS		150	350	300		

FOOTNOTES

A ESTIMATES ARE BASED ON HIGHWAY TEST DATA FROM 3 PEDONS FROM BERNALILLO, EDDY AND VALENCIA COUNTIES, NEW MEXICO.
2 NOT USUALLY UTILIZED BY CATTLE AND SHEEP.
3 NOT USUALLY UTILIZED BY CATTLE. UTILIZED BY SHEEP IN THE SPRING.
1 MODERATELY RAPID PERMEABILITY IS ONLY A MODERATE LIMITATION IN SEMIARID AREAS.

Established Series
Rev. ERB:HBJ
2/74

PECOS SERIES

The Pecos series is a member of the fine, mixed, thermic family of Torrertic Haplustolls. These are dark grayish brown, calcareous, and saline clayey soils in flood plains.

Typifying Pedon: Pecos silty clay - abandoned cropland.
(Colors refer to dry soil unless otherwise stated.)

Ap -- 0-16" -- Dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm; common very fine tubes and pores; common fine threads and soft masses of $CaSO_4$ and other salts; few cracks 0.5 inch wide extending to lower boundary; few fine roots; calcareous; moderately alkaline; abrupt smooth boundary. (10 to 24 inches thick)

A1 -- 16-24" -- Grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; common medium distinct mottles of olive yellow (2.5Y 6/6); weak medium subangular blocky structure; very hard, very firm; few fine roots; common fine threads and soft masses of $CaSO_4$ and other salts; cracks 0.5 inch wide extend to lower boundary; calcareous; moderately alkaline; abrupt wavy boundary. (6 to 20 inches thick)

C1 -- 24-36" -- Reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; structureless; extremely hard, very firm; many fine threads and soft masses of $CaSO_4$ and other salts; cracks 0.5 inch wide extend to lower boundary; calcareous; moderately alkaline; abrupt wavy boundary. (8 to 16 inches thick)

C2 -- 36-42" -- Reddish brown (5YR 5/3) silty clay, reddish brown (5YR 4/3) moist; structureless; very hard, very firm; many very fine threads and soft masses of $CaSO_4$ and other salts, few fine black organic stains along old bedding planes; few cracks 0.5 inch wide; calcareous; moderately alkaline; clear wavy boundary. (4 to 8 inches thick)

C3 -- 42-60" -- Reddish brown (2.5YR 4/4) clay, reddish brown (2.5YR 3/4) moist; structureless; extremely hard, extremely firm; few cracks 0.5 inch wide; many threads and soft masses of $CaSO_4$; few gypsum crystals; calcareous; moderately alkaline.

Type Location: Ward County, Texas. 3.25 miles southwest of Barstow on U. S. Highway 80, then 2.1 miles northwest on county road, 0.3 mile southwest on field road paralleling canal No. 1, and 100 feet northwest in field.

Range in Characteristics: Thickness of the soil to a contrasting textural horizon ranges from 50 to more than 100 inches: The average clay content of the 10- to 40-inch control section ranges from 35 to about 60 percent. The texture of the soil is clay, silty clay, or silty clay loam. The soils have cracks 0.4 to 1 inch wide to a depth of 20 inches or more. The electrical conductivity ranges from about 2 to 20 millimhos/cm. Dry color of the A horizon is brown (7.5YR 5/2, 4/2; 10YR 5/3, 4/3), dark brown (7.5YR 3/2; 10YR 3/3), grayish brown (10YR 5/2; 2.5Y 5/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), or very dark grayish brown (10YR 3/2; 2.5Y 3/2). The mollic epipedon ranges from 12 to about 30 inches thick. Dry color of the C horizon ranges in hues from 10YR to 5YR. Some pedons have thin strata and mottles of olive, olive gray, or gray in the lower C horizon.

Competing Series and their Differentiae: These include Bosque, Frio, Gageby, Spur, and Toyah series. Bosque, Frio, Gageby, and Spur soils are moist in some part of the moisture control section more than 180 cumulative days most years. The Bosque, Gageby, Spur, and Toyah soils have less than 35 percent clay in the 10- to 40-inch control section.

Setting: The Pecos soils are on the flood plains of the Pecos River and its major tributaries. Surfaces are plane to concave, and slopes are less than about 1 percent. They have formed in calcareous and saline clayey alluvium several feet deep. The climate is arid to semi-arid with the average annual precipitation ranging from 10 to 16 inches, and Thornthwaite P-E indices less than 24. The mean annual temperature ranges from 58 to 69° F.

USDA-SCS-FORT WORTH, TEX. 1974

Principal Associated Soils: These include Toyah of the competing series and Arno, Gila, and Patrole soils. Arno, Gila, and Patrole soils have ochric epipedons.

Drainage and Permeability: Slow internal drainage; slow runoff; very slow permeability.

Use and Vegetation: Rangeland of low carrying capacity. Some areas were formerly used for cropland but are now largely abandoned. The principal vegetation includes alkali sacaton, fourwing salt bush, pickleweed, salt cedar, and some mesquite.

Distribution and Extent: In the Trans-Pecos area of Texas and New Mexico, mainly along the Pecos River and major tributaries. The series is of moderate extent.

Series Established: Reeves County, Texas; 1922.

Remarks: These soils were classified in the Alluvial great soil group.

National Cooperative Soil Survey
U. S. A.

TX0268

SOIL SURVEY INTERPRETATIONS

PECOS SERIES

MLRA(S): 42
REV. ERB.FBJ, 5-76
TORRERTIC HAPLUSTOLLS, FINE, MIXED, THERMIC

THE PECOS SERIES CONSISTS OF DEEP, MODERATELY WELL DRAINED, NEARLY LEVEL SOILS OF FLOOD PLAINS. THE SOIL FORMED IN CALCAREOUS STRATIFIED CLAYEY ALLUVIUM. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK GRAYISH BROWN SILTY CLAY ABOUT 16 INCHES THICK. THE NEXT LAYER IS GRAYISH BROWN SILTY CLAY ABOUT 8 INCHES THICK. THE SUBSTRATUM TO A DEPTH OF 60 INCHES IS REDDISH BROWN STRATIFIED CLAY AND SILTY CLAY. SLOPES ARE LESS THAN 1 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-24	SIC, SICL, CL	CH, CL	A-7, A-6	0	100	95-100	90-100	80-95	31-55	15-35
24-60	C, SIC, SICL	CL, CH	A-6, A-7	0	100	95-100	90-100	80-95	36-65	18-40

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-24	0.06-0.2	0.12-0.20	7.9-8.4	2-4	HIGH	HIGH	LOW	.32	5	-
24-60	<0.06	0.10-0.18	7.9-8.4	2-4	HIGH	HIGH	LOW	.32		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
RARE-COMMON	BRIEF	JUL-OCT	>6.0			-		>60		-		D	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	COMMON: SEVERE-FLOODS, PERCS SLOWLY RARE: SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	SEVERE-FLOODS
SANITARY LANDFILL (TRENCH)	COMMON: SEVERE-FLOODS, TOO CLAYEY RARE: SEVERE-TOO CLAYEY
SANITARY LANDFILL (AREA)	COMMON: SEVERE-FLOODS RARE: MODERATE-FLOODS
DAILY COVER FOR LANDFILL	POOR-TOO CLAYEY

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	COMMON: SEVERE-FLOODS, TOO CLAYEY RARE: SEVERE-TOO CLAYEY
DWELLINGS WITHOUT BASEMENTS	COMMON: SEVERE-FLOODS, SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
DWELLINGS WITH BASEMENTS	COMMON: SEVERE-FLOODS, SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	COMMON: SEVERE-FLOODS, SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
LOCAL ROADS AND STREETS	COMMON: SEVERE-SHRINK-SWELL, FLOODS RARE: SEVERE-SHRINK-SWELL
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

SOURCE MATERIAL (A)

ROADFILL	POOR-SHRINK-SWELL
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	POOR-TOO CLAYEY

WATER MANAGEMENT

POND RESERVOIR AREA	SLIGHT
EMBANKMENTS DIKES AND LEVEES	SLIGHT
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	PERCS SLOWLY, FLOODS
IRRIGATION	SLOW INTAKE, FLOODS
TERRACES AND DIVERSIONS	PERCS SLOWLY
GRASSED WATERWAYS	DROUGHTY

REGIONAL INTERPRETATIONS

RECREATION (B)

CAMP AREAS	SEVERE-FLOODS	PLAYGROUNDS	SEVERE-TOO CLAYEY
PICNIC AREAS	SEVERE-TOO CLAYEY	PATHS AND TRAILS	SEVERE-TOO CLAYEY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		ALFALFA HAY (TONS)		BARLEY (BU)		SORGHUM SILAGE (TONS)		CORN SILAGE (TONS)			
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	6S	2S	-	1250	-	130	-	8.0	-	80	-	30	-	22		

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	V. POOR	FAIR	POOR	POOR	POOR	-	POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE ALL				
GIANT SACATON	SPWR2	10				
ALKALI SACATON	SPAI	12				
VINE-MESQUITE	PAOB	7				
TOBOSA	HIMU2	25				
SIDEOATS GRAMA	BOCU	10				
CANE BLUESTEM	ANBA	10				
WHITE TRIDENS	TRAL2	3				
LITTLELEAF SUMAC	RHMI3	5				
APACHEPLUME	FAPA	5				
BRICKELLIA	BRICK	5				
TARBUSH	FLCE*	3				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2000				
NORMAL YEARS		1300				
UNFAVORABLE YEARS		700				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS". NOV. 1971.
B RECREATION RATINGS BASED ON SOILS MEMORANDUM-69 OCT. 1968.
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74. JAN. 1972.
D CLAYEY BOTTOMLAND RANGE SITE.
1 RATINGS BASED ON SRWPC COMMITTEE IV GUIDE. DRAFT. APR. 1970.

TX0109

SOIL SURVEY INTERPRETATIONS

PECOS SERIES
SALINE

MLRA(S): 42
REV. HBJ.ERB. 7-76
ORRERTIC HAPLUSTOLLS, FINE, MIXED, THERMIC

HE PECOS SERIES CONSISTS OF DEEP, MODERATELY WELL DRAINED, NEARLY LEVEL SOILS OF FLOOD PLAINS. THE SOIL FORMED IN CALCAREOUS STRATIFIED CLAYEY ALLUVIUM. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK GRAYISH BROWN SILTY CLAY ABOUT 16 INCHES THICK. THE NEXT LAYER IS GRAYISH BROWN SILTY CLAY ABOUT 8 INCHES THICK. THE SUBSTRATUM TO A DEPTH OF ABOUT 60 INCHES IS REDDISH BROWN STRATIFIED CLAY AND SILTY CLAY. SLOPES ARE LESS THAN 1 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO.				LIQUID LIMIT	PLASTICITY INDEX
					4	10	40	200		
0-24	SIC, SICL, CL	CH, CL	A-7, A-6	0	100	95-100	90-100	80-95	30-55	15-35
24-60	C, SIC, SICL	CL, CH	A-6, A-7	0	100	95-100	90-100	80-95	36-65	18-40

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY		EROSION FACTORS		WIND EROD. GROUP
						STEEL	CONCRETE	K	T	
0-24	0.06-0.2	0.01-0.15	7.9-8.4	>4	HIGH	HIGH	LOW	.32	5	-
24-60	<0.06	0.01-0.15	7.9-8.4	>4	HIGH	HIGH	LOW	.32		

FLOODING			HIGH WATER TABLE			CEMENTED PAN		BEDROCK		SUBSIDENCE		HYD GRP	POTENT'L FROST ACTION
FREQUENCY	DURATION	MONTHS	DEPTH (FT)	KIND	MONTHS	DEPTH (IN)	HARDNESS	DEPTH (IN)	HARDNESS	INIT. (IN)	TOTAL (IN)		
RARE-COMMON	BRIEF	JUL-OCT	>6.0			-		>60		-		D	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	COMMON: SEVERE-FLOODS,PERCS SLOWLY RARE: SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	SEVERE-FLOODS
SANITARY LANDFILL (TRENCH)	COMMON: SEVERE-FLOODS,TOO CLAYEY RARE: SEVERE-TOO CLAYEY
SANITARY LANDFILL (AREA)	COMMON: SEVERE-FLOODS RARE: MODERATE-FLOODS
DAILY COVER FOR LANDFILL	POOR-TOO CLAYEY

SOURCE MATERIAL (A)

ROADFILL	POOR-SHRINK-SWELL
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	POOR-TOO CLAYEY,EXCESS SALT

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	COMMON: SEVERE-FLOODS,TOO CLAYEY RARE: SEVERE-TOO CLAYEY
DWELLINGS WITHOUT BASEMENTS	COMMON: SEVERE-FLOODS,SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
DWELLINGS WITH BASEMENTS	COMMON: SEVERE-FLOODS,SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	COMMON: SEVERE-FLOODS,SHRINK-SWELL RARE: SEVERE-SHRINK-SWELL
LOCAL ROADS AND STREETS	COMMON: SEVERE-SHRINK-SWELL,FLOODS RARE: SEVERE-SHRINK-SWELL
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

WATER MANAGEMENT

POND RESERVOIR AREA	SLIGHT
EMBANKMENTS DIKES AND LEVEES	MODERATE-EXCESS SALT
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	PERCS SLOWLY,FLOODS,EXCESS SALT
IRRIGATION	EXCESS SALT,SLOW INTAKE,FLOODS
TERRACES AND DIVERSIONS	PERCS SLOWLY
GRASSED WATERWAYS	EXCESS SALT,DROUGHTY

REGIONAL INTERPRETATIONS

RECREATION (B)

CAMP AREAS	SEVERE-FLOODS	PLAYGROUNDS	SEVERE-TOO CLAYEY
PICNIC AREAS	SEVERE-TOO CLAYEY	PATHS AND TRAILS	SEVERE-TOO CLAYEY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		BARLEY (BU)		ALFALFA HAY (TONS)									
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
SLIGHTLY	7S	3S	-	750	-	65	-	6								
MODERATELY	7S	4S	-	500	-	50	-	4								
STRONGLY	7S	6S	-	-	-	-	-	-								

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	V. POOR	V. POOR	POOR	-	V. POOR	POOR	POOR	GOOD	V. POOR	-	FAIR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
GIANT SACATON	SPWR2	15				
TWOFLOWER TRICHLORIS	TRCR	15				
ALKALI SACATON	SPAI	15				
VINE-MESQUITE	PAOB	10				
WHITE TRIDENS	TRAL2	10				
CANE BLUESTEM	ANBA	5				
TOBOSA	HIMU2	10				
BUSH MUHLY	MUPO2	5				
FOURWING SALTBUSH	ATCA2	10				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		2000				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		1000				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS", NOV. 1971
B RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
D SALTY BOTTOMLAND RANGE SITE
1 RATING BASED ON SAWPC COMMITTEE IV GUIDE, DRAFT APR. 1970

Established Series
Rev. PSD/BDS/JBC
5/76

PHILDER SERIES

The Philder series consists of shallow, well drained soils that formed in alluvium influenced by eolian deposits. Philder soils are on fan pediments in the uplands and have slopes of 2 to 5 percent. Mean annual precipitation is about 11 inches and mean annual air temperature is about 61°F.

Taxonomic Class: Loamy-skeletal, carbonatic, thermic, shallow Ustollic Paleorthids.

Typical Pedon: Philder very fine sandy loam, rangeland. (Colors are for dry soil unless otherwise noted.)

A1--0 to 4 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) moist; upper 1/4 inch moderate thin platy; weak fine and medium granular and weak fine subangular blocky structure, soft, very friable, slightly sticky; common fine and very fine roots; many very fine and fine pores; weakly calcareous; mildly alkaline; clear smooth boundary. The surface is covered with about 30 percent of extremely hard carbonate fragments less than 1/2 inch in diameter. (2 to 4 inches thick)

B1ca--4 to 8 inches; brown (10YR 5/3) light sandy clay loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many fine and very fine pores; strongly calcareous; moderately alkaline; clear smooth boundary. (3 to 4 inches thick)

B2ca--8 to 12 inches; pale brown (10YR 6/3) gravelly light sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine and very fine pores; about 30 percent gravel size indurated carbonated nodules and 2 percent cobbles of the same material; strongly calcareous; moderately alkaline; clear wavy boundary. (3 to 4 inches thick)

C1ca--12 to 18 inches; pale brown (10YR 6/3) very gravelly silt loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky; common fine roots; many very fine pores; 85 percent cobbles and gravel, cobbles make up 5 percent, and gravel size carbonate nodules make up 80 percent; strongly calcareous; moderately alkaline; abrupt wavy boundary. (6 to 8 inches thick)

C2cam--18 to 29 inches; white (10YR 8/2) carbonate-cemented material, white (10YR 8/2) moist, massive; extremely hard; upper 1/2 inch is laminar; large cobbly material is recemented or plugged by carbonate; strongly calcareous; moderately alkaline; clear wavy boundary. (6 to 11 inches thick)

C3ca--29 to 42 inches; white (10YR 8/2) very gravelly and cobbly silt loam, very pale brown (10YR 7/3) moist; massive; very hard, firm, slightly sticky and slightly plastic; limestone cobbles and pebbles coated with thick masses of carbonates about 55 percent coarse fragments of which 15 percent is cobble size and 40 percent gravel size, about half of each is in the form of hard petrocalcic materials; strongly calcareous; moderately alkaline.

Type Location: Otero County, New Mexico; in the northeast corner of SW1/4 sec. 20, T.13E. T.22S.

Range in Characteristics: Depth to the petrocalcic horizon ranges from 12 to 20 inches. Coarse fragments of extremely hard carbonate nodules normally less than 1/2 inch in diameter cover the surface and make up 20 to 45 percent of the surface inch.

The A horizon is dark grayish brown, dark brown, or brown dry, and very dark grayish brown, dark grayish brown, or dark brown moist. Value is 3 through 5 and chroma is 2 or 3. This horizon is very fine sandy loam, fine sandy loam, or loam.

The B horizon is pale brown, brown, or yellowish brown dry and brown, yellowish brown, dark brown, or dark yellowish brown moist. Value is 3 through 6 and chroma is 3 through 6. This horizon is light sandy clay loam, or gravelly loam. Structure ranges from weak or moderate fine or medium subangular blocky. The gravel fragments are present normally in the lower part of the B horizon.

The C1ca horizon is pale brown, very pale brown or light yellowish brown dry and yellowish brown, brown or light yellowish brown moist. Value is 4 through 8 and chroma is 3 through 6. This horizon is very gravelly silt loam or very gravelly loam. Pebbles are fragments of petrocalcic material and range from 55 to 85 percent; cobbles range from 3 to 5 percent.

The Ccam horizon is continuously cemented except for scattered cracks and pipes of very hard non-indurated material. It is mainly white (10YR 8/2) or very pale brown (10YR 8/3, 8/4).

The C3ca horizon is mainly white (10YR 8/2) or very pale brown (10YR 8/3, 8/4, 7/3). It is gravelly to very gravelly and in places cobbly; the limestone fragments are thickly coated with carbonates. Gravel ranges from 35 to 60 percent and cobbles range from 10 to 30 percent. Approximately one-half of the fragments are petrocalcic material.

Competing Series: These are the Bard, Cave, Crystal Springs, Delco (t), Delnorte, Goodsprings, Las Vegas, Monterosa, Mormon Mesa, Simona, Tencee, Upton and Winkle series. Bard, Cave, Crystal Springs, Goodsprings, Las Vegas, Mormon Mesa, Simona and Upton soils lack a skeletal control section. Also, Cave, Goodsprings and Simona soils lack carbonatic mineralogy. Crystal Springs and Delco soils have a mesic temperature regime. Delnorte, Monterosa and Winkle soils have mixed mineralogy. Tencee soils have an aridic moisture regime.

Geographic Setting: These soils are on upland fan pediments where elevations range from 4,500 to 5,300 feet. Ridges are common. Slopes range from 0 to 15 percent, but are dominantly 2 to 5 percent. The soils formed in medium textured alluvial deposits with a major influence of eolian sediments. Mean annual temperature ranges from 58° to 64°F.; mean annual precipitation ranges from 10 to 12 inches with 1/2 falling between May and October. The frost-free season is 180 to 220 days.

Geographically Associated Soils: These are the Arch, Jerag, Reyab, and Lozier soils. Arch, Reyab, and Lozier soils lack petrocalcic horizons, and Lozier soils are shallow over bedrock. Jerag soils have an argillic horizon.

Drainage and Permeability: Well-drained; medium runoff; moderate permeability.

Use and Vegetation: Rangeland and military reservations. Vegetation is mainly black grama, blue grama, alkali sacaton, creosotebush, mesquite, Mormontea, and scattered threeawn.

Distribution and Extent: Southern New Mexico and possible west-central Texas. It is of moderate extent.

Series Established: Otero Area, Otero County, New Mexico, 1976.

Remarks: Classification is not entirely supported by the characterization data from sample S74NM35-5-(1-). The organic carbon is higher than expected and shows enough clay increase to justify an argillic horizon. However, field observations indicate that the majority of pedons do not have an argillic horizon. Thus the series is placed as in Ustollic Paleorthids rather than Petrocalcic Ustollic Paleargids.

National Cooperative Soil Survey
U. S. A.

NM0167

SOIL INTERPRETATIONS RECORD

SOIL SERIES FILE

PHILDER SERI

MLRA(S): 42, 70
REV. PSD. ~~11-76~~ 6-77
USTOCHREPTIC PALEORTHIDS, LOAMY-SKELETAL, CARBONATIC, THERMIC, SHALLOW

THE PHILDER SOILS ARE SHALLOW AND WELL-DRAINED. THEY FORMED IN MEDIUM TEXTURED EOLIAN AND UPLAND ALLUVIUM ON MESA TOPS AND PEDIMENTS. ELEVATIONS RANGE FROM 4500 TO 5300 FEET. MEAN ANNUAL PRECIPITATION IS 12 TO 14 INCHES. MEAN ANNUAL AIR TEMPERATURE IS 56 TO 64 F. AND THE FROST-FREE SEASON IS 170 TO 200 DAYS. TYPICALLY THE SOIL PROFILE IS A BROWN VERY FIN SANDY LOAM AND LIGHT SANDY CLAY LOAM OVERLYING PALE BROWN VERY GRAVELLY SANDY CLAY LOAMS. INDURATED CALICHE OCCURS AT 12 TO 20 INCHES AND IS ABOUT 11 INCHES THICK. SLOPES ARE 0 TO 10 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-4	VFSL, FSL, L	SM, ML, CL-ML, SM-SC	A-4	0	90-100	85-100	80-100	35-65	15-25	NP-5
4-12	GR-SCL, SCL, GR-L	SM, GM-GC, SM-SC, GM	A-2, A-4	0-5	70-100	65-95	55-85	30-50	15-25	NP-5
12-18	GRV-SIL, GRV-L	GM, GP-GM, GM-GC	A-1, A-2	5-10	25-45	20-40	15-35	10-30	15-25	NP-5
18-29	IND									
29-60	GRV-SIL, GRV-L	GM, GP-GM, GM-GC	A-1, A-2	15-30	30-45	25-40	20-35	10-30	15-25	NP-5

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-4	5-10	-	0.6-2.0	0.15-0.17	7.4-7.8	<2	LOW	.32	1	3	-	HIGH	LOW
4-12	20-25	-	0.6-2.0	0.12-0.14	7.9-8.4	<2	LOW	.28					
12-18	10-15	-	0.6-2.0	0.04-0.06	7.9-8.4	<2	LOW	.17					
18-29													
29-60	10-15	-	0.6-2.0	0.04-0.06	7.9-8.4	<2	LOW	.17					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			12-20	RIPPABLE	>60		-		D	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-CEMENTED PAN
SEWAGE LAGOON AREAS	0-7%: SEVERE-CEMENTED PAN 7-10%: SEVERE-SLOPE, CEMENTED PAN
SANITARY LANDFILL (TRENCH)	SEVERE-CEMENTED PAN
SANITARY LANDFILL (AREA)	0-8%: SLIGHT 8-10%: MODERATE-SLOPE
DAILY COVER FOR LANDFILL	POOR-THIN LAYER, AREA RECLAIM

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	0-8%: MODERATE-CEMENTED PAN 8-10%: MODERATE-CEMENTED PAN, SLOPE
DWELLINGS WITHOUT BASEMENTS	0-8%: MODERATE-CEMENTED PAN 8-10%: MODERATE-SLOPE, CEMENTED PAN
DWELLINGS WITH BASEMENTS	0-8%: MODERATE-CEMENTED PAN 8-10%: MODERATE-CEMENTED PAN, SLOPE
SMALL COMMERCIAL BUILDINGS	0-4%: MODERATE-CEMENTED PAN 4-8%: MODERATE-CEMENTED PAN, SLOPE 8-10%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: MODERATE-CEMENTED PAN 8-10%: MODERATE-CEMENTED PAN, SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

CONSTRUCTION MATERIAL

ROADFILL	POOR-THIN LAYER, AREA RECLAIM
SAND	UNSUITED
GRAVEL	~~UNSUITED-THIN LAYER~~
TOPSOIL	POOR-SMALL STONES, AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	~~CEMENTED PAN~~, SEEPAGE DEPTH TO PAN,
EMBANKMENTS DIKES AND LEVEES	THIN LAYER, SEEPAGE
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	0-3%: CEMENTED PAN 3+%: CEMENTED PAN, SLOPE
IRRIGATION	0-3%: DROUGHTY, ROOTING DEPTH 3+%: DROUGHTY, ROOTING DEPTH, SLOPE
TERRACES AND DIVERSIONS	CEMENTED PAN, ROOTING DEPTH, COMPLEX SLOPE
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATIONAL DEVELOPMENT

CAMP AREAS	0-8%: MODERATE-DUSTY 8-10%: MODERATE-DUSTY, SLOPE	PLAYGROUNDS	0-6%: SEVERE-CEMENTED PAN 6-10%: SEVERE-CEMENTED PAN, SLOPE
PICNIC AREAS	0-8%: MODERATE-DUSTY 8-10%: MODERATE-DUSTY, SLOPE	PATHS AND TRAILS	MODERATE-DUSTY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	6E															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	COMMON TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
IRR	ARIZONA CYPRESS	20	RUSSIAN-OLIVE	20	GREEN ASH	15	SIBERIAN ELM	15
	ROCKY MT. JUNIPER	10	ORIENTAL ARBORVITAE	10				

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	FAIR	FAIR	-	-	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
BLUE GRAMA	BOGR2	5				
BLACK GRAMA	BOER4	60				
VINE-MESQUITE	PAOB	2				
THREEAWN	ARIST	3				
SAND DROPSEED	SPCR	4				
BUSH MUHLY	MUPO2	5				
FOURWING SALTBUSH	ATCA2	4				
PLAINS BRISTLEGRASS	SEMA5	2				
OTHER PERENNIAL FORBS	PPFF	5				
OTHER ANNUAL FORBS	AAFF	2				
COMMON JAVALINABUSH 2/	MIER*	2				
MESA DROPSEED	SPFL2	4				
SMALL SOAPWEED	YUGL	1				
NEVADA MORMON-TEA	EPNE	1				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1000				
NORMAL YEARS		900				
UNFAVORABLE YEARS		600				

FOOTNOTES

ESTIMATED ENGINEERING PROPERTIES ARE BASED ON TEST DATA OF 1 PEDON FROM OTERO COUNTY, NEW MEXICO.
SUITABLE AS A SOURCE OF CRUSHED CALICHE GRAVEL.
NOT USUALLY UTILIZED BY CATTLE AND SHEEP.

Established Series
Rev. WJR/VGL
5/72

PORTALES SERIES

The Portales series is a member of the fine-loamy, mixed, thermic family of Aridic Calciustolls. Typically, Portales soils have calcareous grayish brown loam A horizons, calcareous pale brown light clay loam B2 horizons, and distinct layers of carbonate accumulation in the C horizon.

Typifying Pedon: Portales loam
(Colors are for dry soil unless otherwise noted.)

Ap 0-8"--Grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak platy structure in the upper inch, moderate medium granular structure below; soft, friable; common fine roots, many very fine pores; calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary. (5 to 10 inches thick)

A12 8-15"--Grayish brown (10YR 5/2) light clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic and moderate medium subangular blocky structure; slightly hard, friable, slightly sticky; many fine roots; many very fine and fine pores; calcareous, lime disseminated; moderately alkaline; clear smooth boundary. (5 to 10 inches thick)

B2 15-25"--Pale brown (10YR 6/3) light clay loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky; common fine roots; common very fine pores; strongly calcareous, lime disseminated to 18 inches, below 18 inches lime is segregated in fine soft bodies and in fine seams; moderately alkaline; clear smooth boundary. (5 to 25 inches thick)

C1ca 25-50"--White (10YR 8/2) clay loam, light gray (10YR 7/2) moist; massive; soft, but with few hard weakly cemented bodies, friable, slightly sticky; few fine roots in upper part; few very fine pores; strongly calcareous throughout, common soft to hard lime bodies throughout; moderately alkaline; gradual irregular boundary. (15 to 60 inches thick)

C2 50-80"--Very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky; common very fine and fine irregular pores; strongly calcareous, lime disseminated and segregated as few soft and slightly hard bodies; moderately alkaline.

Type Location: Roosevelt County, New Mexico; SE1/4SE1/4SE1/4 sec. 25, T.1S., R.34E.

Range in Characteristics: Depth to the calcic horizon ranges from 20 to 40 inches. The solum is mildly or moderately alkaline. Mean annual soil temperature ranges from 59° to 71.6°F. These soils are dry in all parts above 12 inches for more than half the time the soil temperature exceeds 41°F. The driest period is between October and April. The A horizon has hue of 5YR through 10YR, value of 4 to 5.5 dry and 2 to 3.5 moist, and chroma of 2 to 3.5. The B horizon has hue of 5YR through 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 through 5. The control section averages heavy loam to clay loam containing 18 to 35 percent clay. The C horizon has hue of 5YR through 10YR, value of 6 through 8 dry and 5 through 7 moist, and chroma of 2 through 4. The Cca horizon or the horizon of maximum accumulation contains between 15 and 40 percent calcium carbonate, and at least 5 percent more than the underlying horizon and more than 5 percent is secondary carbonates.

Competing Series and their Differentiae: These are the Arch, Dioxice, Mansc, Mansker, Nuvalde, and Veal series. Arch soils lack mollic epipedons and have calcic horizons of depths of less than 20 inches. Dioxice soils have mean annual soil temperature of 47° to 59°F. Mansic soils have less than 10 percent whitish concretions or other masses of segregated $CaCO_3$ in the Cca horizon and are 10 to 20 inches deep to the zone of lime segregation. Mansker soils are 7 to 18 inches deep to the Cca horizon. Nuvalde soils have 35 to 45 percent clay in the control section. Veal soils lack mollic epipedons.

Setting: The Portales soils are on nearly level to gently sloping upland plains with level to weakly convex surfaces. The soils formed in medium to moderately fine textured, calcareous, mixed sediments. The climate is semiarid to dry subhumid. The mean annual temperature near the type location is 61°F., and the mean annual precipitation is 18 inches and ranges from 16 to 20 inches with a marked summer maximum. The Thornthwaite P-E index ranges from 22 to 32.

Principal Associated Soils: These are the competing Arch and Mansker soils and the Amarillo, Olton, Potter, and Zita soils. Amarillo soils lack mollic epipedons and have argillic horizons. Olton soils have argillic horizons and average more than 35 percent clay in the control section. Potter soils lack mollic epipedons and are shallow to very shallow to the calcic horizon. Zita soils after mixing are noncalcareous in the upper 7 inches.

Drainage and Permeability: Well-drained; very slow runoff; moderate permeability.

Use and Vegetation: Widely used for dry farming and irrigated cropland. Principal crops are cotton and grain sorghums. Native vegetation is short grasses, dominantly gramas and buffalograss.

Distribution and Extent: The Portalles soils are on the high plains of eastern New Mexico and western Texas. They are of large extent.

Series Established: Roosevelt County (Roosevelt County SCD Survey), New Mexico, 1940.

National Cooperative Soil Survey
U. S. A.

SOIL SURVEY INTERPRETATIONS

MLRA(S): 77
DSP, 11-74
ARIDIC CALCIUSTOLLS, FINE-LOAMY, MIXED, THERMIC

PORTALES SERIES

THE PORTALES SERIES CONSISTS OF DEEP WELL-DRAINED SOILS FORMED IN CALCAREOUS ALLUVIAL SEDIMENTS MODIFIED BY WIND ON UPLANDS. SLOPES ARE 0 TO 5 PERCENT. ELEVATIONS RANGE FROM 3600 TO 4800 FT. MEAN ANNUAL PRECIPITATION IS 12 TO 16 IN. MEAN ANNUAL AIR TEMPERATURE IS 57 TO 64F., AND THE FFS IS 180 TO 205 DAYS. TYPICALLY THE SURFACE LAYER IS A GRAYISH-BROWN LOAM AND CLAY LOAM ABOUT 8 IN. THICK. THE SUBSOIL IS A PALE BROWN CLAY LOAM ABOUT 10 IN. THICK, AND THE SUBSTRATUM A WHITE AND VERY PALE BROWN CLAY LOAM.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	L, CL	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	60-80	25-35	5-15
0-8	FSL	SM, SM-SC, CL-ML, ML	A-4	0	100	95-100	75-90	40-60	<30	NP-10
8-80	L, CL	CL	A-6	0	100	95-100	90-100	60-80	25-40	10-20

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-8	0.6-2.0	0.15-0.18	7.4-8.4	<2	LOW	HIGH	LOW	.32	3	4L
0-8	0.6-2.0	0.12-0.15	7.4-8.4	<2	LOW	HIGH	LOW	.28	3	3
8-80	0.6-2.0	0.13-0.17	7.4-8.4	<2	MODERATE	HIGH	LOW	.32		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2+%: MODERATE-SEEPAGE,SLOPE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-AREA RECLAIM

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	MODERATE-LOW STRENGTH,SHRINK-SWELL
DWELLINGS WITH BASEMENTS	MODERATE-LOW STRENGTH,SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	0-4%: MODERATE-LOW STRENGTH,SHRINK-SWELL 4+%: MODERATE-SLOPE,LOW STRENGTH, SHRINK-SWELL
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH,SHRINK-SWELL
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

SOURCE MATERIAL

ROADFILL	FAIR-LOW STRENGTH,AREA RECLAIM,SHRINK-SWELL
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-EXCESS LIME,AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	LOW STRENGTH,COMPRESSIBLE,PIPING
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	FAVORABLE
IRRIGATION	SOIL BLOWING,EXCESS LIME
TERRACES AND DIVERSIONS	SOIL BLOWING
GRASSED WATERWAYS	DROUGHTY

REGIONAL INTERPRETATIONS

RECREATION

CAMP AREAS	SLIGHT	PLAYGROUNDS	0-2%: SLIGHT 2+%: MODERATE-SLOPE
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		ALFALFA HAY (TONS)		BARLEY (BU)		COTTON LINT (LBS)		GRAIN SORGHUM (BU)		PEANUTS (LBS)		SWEET POTATOES (BU)			
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1% HIGH PRECIP	4E	2E	-	7	-	75	180	1000	1200	125	-	2200	-	800		
1-3% HIGH PRECIP	4E	3E	-	6	-	65	160	900	1050	110	-	1950	-	720		
0-1% LOW PRECIP	6E	2E	-	7	-	75	-	1000	-	125	-	2200	-	800		
1-3% LOW PRECIP	6E	3E	-	6	-	65	-	900	-	110	-	1950	-	720		
3+%	6E	4E	-		-						-		-			

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
0-3% NIRR,HIGH PRECIP	FAIR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
0-3% NIRR,LOW PRECIP	POOR	FAIR	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
3+% NIRR	POOR	FAIR	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
0-1% IRR,LOW PRECIP, ?	GOOD	GOOD	FAIR	-	-	FAIR	GOOD	FAIR	GOOD	-	FAIR	FAIR
1-3% IRR,LOW PRECIP, ?	FAIR	GOOD	FAIR	-	-	FAIR	GOOD	POOR	FAIR	-	POOR	FAIR
3+% IRR	FAIR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: L,CL	FSL			
BLACK GRAMA	BOER4	20	5			
SIDEOATS GRAMA	BOCU	15	15			
LITTLE BLUESTEM	ANSC2	-	15			
NEEDLEANDTHREAD	STCO4	-	10			
NEWMEXICO FEATHERGRASS	STNE2	-	5			
ARIZONA COTTONTOP	TRCA2	5	-			
WINTERFAT	EULA5	10	5			
BLUE GRAMA	BOGR2	20	15			
HAIRY GRAMA	BOHI2	10	5			
BUFFALOGRASS	BUDA	5	-			
TOBOSA	HIMU2	10	10			
SAND DROPSEED	SPCR	-	5			
SMALL SOAPWEED	YUGL	-	5			
OTHER PERENNIAL GRASSES	PPGG	3	3			
OTHER PERENNIAL FORBS	PPFF	2	2			
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		1500	1800			
NORMAL YEARS		1000	1300			
UNFAVORABLE YEARS		700	1000			

FOOTNOTES

A ESTIMATES OF ENGINEERING PROPERTIES ARE BASED ON TEST AND ANALYTICAL DATA OF 8 PEDONS FROM NEW MEXICO AND TEXAS.

SOIL SERIES FILE

NM.

Established Series
Rev. ERB
8/74

PYOTE SERIES

The Pyote series is a member of the loamy, mixed, thermic family of Arenic Ustalfic Haplargids. These soils have reddish non-calcareous loamy fine sand A1 horizons, Bt horizons of fine sandy loam that are reddish and non-calcareous, and C horizons with a zone of carbonate accumulation.

Typifying Pedon: Pyote loamy fine sand - rangeland.
(Colors are for dry conditions unless specified otherwise.)

A11 -- 0-12 inches, yellowish-red (5YR 5/6) loamy fine sand, yellowish-red (5YR 4/6) moist; structureless; loose, nonsticky; common fine and few medium roots; noncalcareous; mildly alkaline; gradual smooth boundary. (8 to 16 inches thick)

A12 -- 12-34 inches, reddish-brown (5YR 5/4) loamy fine sand, reddish-brown (5YR 4/4) moist; structureless; loose, nonsticky; few fine and medium roots; some sand grains coated with what appears to be iron oxide; noncalcareous; mildly alkaline; clear smooth boundary. (12 to 24 inches thick)

B21t -- 34-50 inches, reddish-brown (5YR 5/4) fine sandy loam, yellowish-red (5YR 4/6) moist; weak coarse prismatic breaking to weak medium subangular blocky structure; slightly hard, very friable, slightly sticky; clay coatings and bridging of sand grains; many fine tubes and pores; few fine roots; noncalcareous; mildly alkaline; clear smooth boundary. (12 to 20 inches thick)

B22t -- 50-62 inches, yellowish-red (5YR 56) fine sandy loam, yellowish-red (5YR 4/6) moist; weak coarse prismatic breaking to weak medium subangular blocky structure; slightly hard; very friable, slightly sticky; clay coatings on sand grains and some bridging of sand grains is evident; few fine roots; noncalcareous; moderately alkaline; clear wavy boundary. (8 to 20 inches thick)

Cca -- 62-70 inches, pink (5YR 7/3) fine sandy loam, light reddish-brown (5YR 6/3) moist; structureless; slightly hard, very friable; slightly sticky; common fine threads and films $CaCO_3$ and a few fine soft bodies of $CaCO_3$; calcareous; moderately alkaline; gradual wavy boundary. (0 to 16 inches thick)

C -- 70-76+inches, pink (5YR 7/4) fine sandy loam, light reddish-brown (5YR 6/4) moist; structureless; slightly hard, very friable, slightly sticky; few fine threads of $CaCO_3$; calcareous; moderately alkaline.

Type Location: Ward County, Texas; 200 feet west of Spur 65 and 0.2 mile north of Interstate Highway 20 at Wickett, Texas.

Range in Characteristics: Thickness of the solum ranges from 40 to 80 inches.

The A horizon is light reddish brown (5YR 6/3, 6/4), reddish yellow (5YR 6/6; 7.5YR 6/6), reddish brown (5YR 5/3, 5/4), yellowish red (5YR 5/6), brown (7.5YR 5/4), or strong brown (7.5YR 5/6). It is fine sand or loamy fine sand. Thickness ranges from 20 to 40 inches. Reaction ranges from neutral through moderately alkaline.

The Bt horizon is light reddish brown (5YR 6/4), reddish brown (5YR 5/4), reddish yellow (5YR 6/6, 6/8; 7.5YR 6/6, 6/8), light brown (7.5YR 6/4). or strong brown (7.5YR 5/6, 5/8). It is fine sandy loam with a clay content of 8 to 18 percent. Reaction is mildly alkaline or moderately alkaline and noncalcareous or calcareous.

The Cca and C horizons are pink, light reddish brown, light brown, reddish brown, reddish yellow, yellowish red, or strong brown in hues 5YR and 7.5YR. Texture is fine sandy loam, or loamy fine sand. Some pedons are leached of calcium carbonate below depths of 80 inches. An indurated caliche layer occurs in some pedons at depths below 60 inches.

Competing Series and their Differentiae: These include the Berino, Brownfield, Hueco, Maljamar, Palomas, and Springer series. Berino and Palomas soils have A horizons less than 20 inches thick and have more than 18 percent clay in the control sections. Brownfield and Maljamar soils have Bt horizons with 18 to 35 percent clay. Hueco soils have indurated caliche at depths of 20 to 40 inches. Springer soils are not as dry, occurring in regions with rainfall of 16 to 25 inches, and have A horizons less than 20 inches thick.

Setting: The Pyote soils are on nearly level and undulating uplands. Slopes range from 0 to 5 percent. The soil formed in reddish sandy unconsolidated sediments of eolian or alluvial origin. The climate is arid to semiarid. The average annual precipitation ranges from 10 to 15 inches; the mean annual air temperatures from about 57° to 66° F.; and Thornthwaite annual P-E indices from 10 to 22.

Principal Associated Soils: These include Kermit, Mentone, Penwell, and Sharvana series. Kermit and Penwell soils lack argillic horizons and Kermit soils also contain more than 90 percent sand throughout. Sharvana soils have indurated calcic horizons within 20 inches of the surface. Mentone soils lack argillic horizons and are calcareous throughout.

Drainage and Permeability: Well drained; very slow runoff; moderately rapid permeability.

Use and Vegetation: Used for native rangeland. Dropseeds, perennial threeawns, hooded windmill, and black grama are the principal grasses. Sandage, which is a shrub, and mesquite trees are the woody plants.

Distribution and Extent: Western Texas and southeastern New Mexico. The series is moderately extensive.

Series Established: Ward County, Texas; 1969.

Remarks: These soils formerly were classed in the Reddish-Brown great soil group. They were included in the Springer series.

National Cooperative Soil Survey

U. S. A

SOIL SURVEY INTERPRETATIONS

MLRA(S): 41
REV. 10-73
ARENIC USTALFIC HAPLARGIDS, LOAMY, MIXED, THERMIC

PYOTE SERIES

THE PYOTE SERIES CONSISTS OF DEEP, WELL DRAINED, NEARLY LEVEL TO UNDULATING SOILS OF UPLANDS. THE SOIL FORMED IN SANDY EOLIAN AND ALLUVIAL MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS LOAMY FINE SAND ABOUT 34 INCHES THICK. THE SURFACE LAYER IS YELLOWISH RED IN THE UPPER 12 INCHES AND REDDISH BROWN BELOW. THE FINE SANDY LOAM SUBSOIL EXTENDS TO A DEPTH OF 62 INCHES. IT IS REDDISH BROWN IN THE UPPER 16 INCHES AND YELLOWISH RED BELOW. THE SUBSTRATUM IS PINK FINE SANDY LOAM AND HAS ACCUMULATIONS OF CALCIUM CARBONATE. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-34	LFS, FS	SM, SP-SM	A-2-4, A-3	0	100	100	95-100	5-20	<22	NP-3
34-76	FSL	SM, SM-SC	A-2-4	0	100	100	95-100	13-30	<25	NP-7

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
0-34	6.0-20	0.03-0.09	6.6-8.4	-	VERY LOW	LOW	LOW	.10	5	1
34-76	2.0-6.0	0.08-0.14	6.6-8.4	-	LOW	LOW	LOW	.17		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		A	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-TOO SANDY

COMMUNITY DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (B)

ROADFILL	GOOD
SAND	POOR-EXCESS FINES
GRAVEL	UNSUITED
TOPSOIL	POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-SEEPAGE,PIPING
EXCAVATED PONDS AQUIFIER FED	SEVERE-DEEP TO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	FAST INTAKE,ERODES EASILY
TERRACES AND DIVERSIONS	TOO SANDY,ERODES EASILY
GRASSED WATERWAYS	ERODES EASILY

RECREATION (C)

CAMP AREAS	MODERATE-TOO SANDY	PLAYGROUNDS	0-2%: MODERATE-TOO SANDY 2-5%: MODERATE-SLOPE,TOO SANDY
PICNIC AREAS	MODERATE-TOO SANDY	PATHS AND TRAILS	MODERATE-TOO SANDY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		ALFALFA HAY (TONS)													
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	6E	4E	-	5												

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (E)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
LITTLE BLUESTEM	ANSC2	10				
SAND BLUESTEM	ANHA	10				
CANE BLUESTEM	ANBA	5				
GIANT DROPSEED	SPGI	5				
SPIKE DROPSEED	SPCO4	10				
MESA DROPSEED	SPFL2	5				
SAND DROPSEED	SPCR	5				
PLAINS BRISTLEGRASS	SEMA5	5				
ARIZONA COTTONTOP	TRCA2	5				
BUSH MUHLY	MUPO2	5				
BLACK GRAMA	BOER4	5				
HOODED WINDMILLGRASS	CHCU2	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER PERENNIAL FORBS	PFFF	10				
OTHER SHRUBS	SSSS	10				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2000				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		1000				

FOOTNOTES

A RATINGS BASED ON ENGINEERING TEST DATA OF 3 PEDONS FROM WARD COUNTY, TEXAS
B RATINGS BASED ON "GUIDE FOR INTERPRETATING ENGINEERING USES OF SOILS, NOV. 1971
C [illegible]EATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968
D [illegible]LIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
E [illegible]Y SAND RANGE SITE
I RATINGS BASED ON SRWPC COMMITTEE GUIDE, DRAFT APR. 1970

SOIL SERIES FILE

Established Series
Rev. ERB
12/73

RATLIFF SERIES

The Ratliff series is a member of the fine-loamy, mixed, thermic family of Ustollic Calciorthids. These soils have calcareous, moderately alkaline grayish brown loam A horizons and clay loam B horizons with a zone of lime accumulation beginning about 25 inches below the surface.

Typifying Pedon: Ratliff loam - rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-10" -- Grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky; light brownish gray platy surface crust 1/8 inch thick; common fine roots and pores; calcareous; moderately alkaline; clear smooth boundary. (6 to 12 inches thick)

B21 -- 10-25" -- Light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; moderate coarse prismatic parting to fine and medium subangular blocky structure; slightly hard, friable, slightly sticky; common very fine roots and pores; few films and threads of $CaCO_3$; calcareous; moderately alkaline; clear wavy boundary. (13 to 28 inches thick)

B22ca -- 25-45" -- Pink (7.5YR 8/4) clay loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky; estimated 30 percent, by volume, concretions and soft bodies of $CaCO_3$; calcareous; moderately alkaline, gradual wavy boundary. (6 to 24 inches thick)

B23ca -- 45-67" -- Reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; slightly hard, friable, sticky, estimated 10 percent by volume of soft bodies of $CaCO_3$; calcareous; moderately alkaline. (12 to 36 inches thick)

B24ca -- 67-80" -- Pinkish gray (7.5YR 7/2) clay loam, pinkish gray (7.5YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky; estimated 30 percent by volume of $CaCO_3$; common black coatings on peds; calcareous; moderately alkaline.

Type Location: Andrews County, Texas; in rangeland 0.15 mile west of a point on Farm Road 1788, which point is 12.1 miles south of intersection of Farm Road 1788 and Texas 176, which intersection is 9 miles east of Andrews, Texas.

Range in Characteristics: The solum is more than 60 inches thick, and depth to the calcic horizon is 20 to 40 inches. The 10- to 40-inch control section is loam, clay loam, or sandy clay loam, with 20 to 35 percent clay. The A horizon is fine sandy loam or loam. It is brown (10YR 5/3; 7.5YR 5/2, 5/4) or grayish brown (10YR 5/2). The B horizons are loam, clay loam, or sandy clay loam. The B2 horizon above the Bca horizon is brown (7.5YR 5/4; 10YR 5/3), light brown (7.5YR 6/4), or pale brown (10YR 6/3). The B2ca horizons range from pinkish white, pinkish gray, or pink (7.5YR 8/2, 7/2, 6/2, 7/4, 8/4) through reddish yellow (7.5YR 7/6, 6/6). Calcium carbonate in the B2ca horizon ranges from 20 to 50 percent, and is mostly in soft powdery form.

Competing Series and their Differentiae: These are Arch, Chispa, Gomez, Hodgins, Mentone, Midessa, Portales, Reagan, Veal, and Wink series. Arch and Veal soils have calcic horizons at depths less than 20 inches, and Veal soils have carbonatic mineralogy. Chispa soils have sola less than 60 inches thick. Gomez, Mentone, and Wink soils have less than 18 percent clay in the 10- 40-inch control section. Hodgins and Reagan soils have a fine-silty control section, and Hodgins soils also lack a calcic horizon within 40 inches. Midessa and Portales soils are usually moist, and Portales soils have a mollic epipedon.

Setting: The Ratliff soils are on upland plains. Slope gradients are 0 to 5 percent. The regolith consists of loamy, calcareous sediments. The climate is semiarid. Average annual precipitation is 13 to 17 inches. Annual Thornthwaite P-E indices vary from 18 to 23. The mean annual air temperature is 63° to 69° F.

USDA-SCS-FORT WORTH, TEX. 1974

Principal Associated Soils: These include the Portales and Wink soils of the competing series and the Blakeney, Conger, Douro, Faskin, and Krade soils. Blakeney and Conger soils are underlain by indurated caliche within 20 inches. Douro and Faskin soils have Bt horizons and are noncalcareous in the surface layers. Krade soils lack B horizons and contain less than 18 percent clay in the 10- to 40-inch control section.

Drainage and Permeability: Well drained; medium surface runoff; moderate permeability.

Use and Vegetation: Used mainly for rangeland but a few areas are cultivated to cotton and grain sorghum. Vegetation includes black grama grass, sand dropseed grass, hooded windmillgrass, plains bristlegrass, burrograss, yucca and a few small mesquite trees.

Distribution and Extent: Southwestern part of the High Plains of Texas and possibly adjoining areas of New Mexico. The series is of moderate extent.

Series Established: Andrews County, Texas; 1970.

Remarks: The soils formerly were included in the Midessa series, but occur in a drier enviroment. These soils were formerly classified in the Calcisol great soil group.

National Cooperative Soil Survey
U. S. A.

TX0200

SOIL SURVEY INTERPRETATIONS

RATLIFF SERIES

MLRA(S): 77, 42
CRB, 12-73
USTOLLIC CALCIORTHIDS, FINE-LOAMY, MIXED, THERMIC

THE RATLIFF SERIES CONSISTS OF DEEP, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN CALCAREOUS LOAMY MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS GRAYISH BROWN LOAM ABOUT 10 INCHES THICK. THE CLAY LOAM SUBSOIL EXTENDS TO A DEPTH OF MORE THAN 80 INCHES AND HAS PROMINENT ACCUMULATIONS OF CALCIUM CARBONATE BELOW A DEPTH OF 25 INCHES. THE SUBSOIL IS LIGHT BROWN IN THE UPPER 15 INCHES, PINK IN THE NEXT 20 INCHES AND REDDISH YELLOW BELOW 45 INCHES. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-10	L	CL, CL-ML, SC, SM-SC	A-4, A-6	0	95-100	95-100	80-100	45-75	22-35	6-17
0-10	FSL	SC, SM-SC, CL, CL-ML	A-2-4, A-4	0	95-100	95-100	75-98	35-55	17-27	4-9
10-25	CL, SCL, L	CL, SC	A-6, A-4	0	95-100	95-100	85-100	45-80	25-40	8-20
25-80	CL, SCL, L	CL, SC	A-6, A-4	0	95-100	95-100	80-100	45-80	25-40	8-20

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
0-10	0.6-2.0	0.14-0.20	7.9-8.4	-	LOW	MODERATE	LOW	.28	5	5
0-10	2.0-6.0	0.10-0.15	7.9-8.4	-	LOW	MODERATE	LOW	.24	5	3
10-25	0.6-2.0	0.12-0.18	7.9-8.4	-	LOW	MODERATE	LOW	.32		
25-80	0.6-2.0	0.10-0.16	7.9-8.4	-	LOW	MODERATE	LOW	.32		

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2-5%: MODERATE-SLOPE,SEEPAGE
SANITARY LANDFILL (TRENCH)	SLIGHT
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	GOOD

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (A)

ROADFILL	FAIR-LOW STRENGTH
SAND	UNSUITED-EXCESS FINES
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	FAIR-THIN LAYER,EXCESS LIME

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	MODERATE-SEEPAGE,PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ERODES EASILY
TERRACES AND DIVERSIONS	FAVORABLE
GRASSED WATERWAYS	ERODES EASILY,DROUGHTY

RECREATION (B)

CAMP AREAS	SLIGHT	PLAYGROUNDS	0-2%: SLIGHT 2-5%: MODERATE-SLOPE
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY NIRR	CAPABILITY IRR.	COTTON LINT (LBS) NIRR	COTTON LINT (LBS) IRR.	GRAIN SORGHUM (BU) NIRR	GRAIN SORGHUM (BU) IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-3%	4E	3E	450	750	15	75										
3-5%	6E	-	--	-	-	-										

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORTALITY	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDEX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	SIBERIAN ELM	30	OSAGE-ORANGE	15	EASTERN REDCEDAR	15	ORIENTAL ARBORVITAE	15

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	FAIR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
BLUE GRAMA	BOGR2	35				
SIDEOATS GRAMA	BOCU	15				
PLAINS BRISTLEGRASS	SEMA5	5				
BLACK GRAMA	BOER4	10				
BUFFALOGRASS	BUDA	10				
ARIZONA COTTONTOP	TRCA2	5				
SAND DROPSEED	SPCR	5				
HOODED WINDMILLGRASS	CHCU2	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		2400				
NORMAL YEARS		1750				
UNFAVORABLE YEARS		1100				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETATING ENGINEERING USES OF SOILS", NOV. 1971.
B RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972.
D SANDY LOAM RANGE SITE.
1 RATINGS BASED ON SEWAGE COMMITTEE IV GUIDE, DRAFT APR. 1970.

Established Series
Rev. WJR/VGL
5/72

REDONA SERIES

The Redona series is a member of the fine-loamy, mixed, thermic family of Ustollic Haplargids. Typically, Redona soils have reddish brown, noncalcareous, fine sandy loam A horizons; reddish brown, sandy clay loam B2t horizons; and distinct zones of lime accumulation in the lower part of the B horizon or in the C horizon.

Typifying Pedon: Redona fine sandy loam - rangeland
(Colors are for dry soil unless otherwise noted.)

A1 0-10"--Reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure in the upper 2 inches grading to weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; many very fine and fine roots; common very fine and fine pores; noncalcareous; mildly alkaline; clear smooth boundary. (6 to 12 inches thick)

B21t 10-24"--Reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic and moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; common clusters of fine rounded insect casts; many thin clay coatings on sand grains and as bridges between the grains; noncalcareous; mildly alkaline; clear smooth boundary. (12 to 16 inches thick)

B22t 24-28"--Reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, nonplastic; common very fine and fine roots; many very fine and fine pores; common clusters of fine rounded insect casts; many thin clay coatings on sand grains and as bridges between the grains; few fine soft lime nodules and concretions; mildly alkaline; abrupt wavy boundary. (3 to 8 inches thick)

B3ca 28-50"--Pink (5YR 8/3) and light reddish brown (5YR 6/4) clay loam, pink (5YR 7/3) and reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; common very fine and fine pebbles; lime disseminated throughout, few very fine concretions; strongly alkaline; clear wavy boundary. (15 to 24 inches thick)

C1ca 50-68"--Light reddish brown (5YR 6/4) and pink (5YR 8/3) clay loam, reddish brown (5YR 5/4) and pink (5YR 7/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; lime disseminated throughout, few very fine concretions; moderately alkaline.

Type Location: Quay County, New Mexico; about 4 miles south of Tucumcari on state highway 18, 1/2 mile north of SW corner of sec. 15, T.10N., R.30E.

Range in Characteristics: The solum is 36 to 60 inches thick. It ranges from noncalcareous in the surface to calcareous throughout, and is mildly alkaline to strongly alkaline. Depth to upper boundary of the zone of maximum lime accumulation ranges from 21 to 40 inches. Mean annual soil temperature is 59° to 71°F. Noncontrasting buried horizons occur below the solum in some pedons. Coarse fragment content in the control section ranges from 0 to 15 percent. The A horizon has hue of 7.5YR or 5YR, value of 4 or 5 dry, and 3 or 4 moist, and chroma of 3 through 5. It has about 1.5 to 0.8 percent organic matter. In pedons that have colors dark enought for a mollic epipedon, the organic matter is too low or the horizon is too thin to qualify as a mollic epipedon. The B2t horizon has hue of 7.5YR through 2.5YR, value of 4 through 6 dry, and 3 through 5 moist, and chroma of 3.5 through 5. It has weak prismatic to moderate subangular blocky structure. The B3ca horizon has the same range in hue as the B2t horizon, but is one to three units higher in value, due to the greater carbonate content. The carbonate content in the layer of maximum accumulation ranges from 15 to 25 percent with more than 5 percent in secondary form and decreases with depth.

Competing Series and their Differentiae: These are the Amarillo, Berino, Canez, Clovis, Courtland, Dona Ana, La Lande, McAllister, Newkirk, Palomas, Penistaja, and Tucumcari series. Amarillo soils are usually moist in the 7 to 20 inch moisture control section. Berino, Dona Ana, and Palomas soils are dry in all parts of the moisture control section more than three quarters of the time cumulative when the soil temperature exceeds 41°F. Canez soils lack a calcic horizon with its upper boundary within 48 inches of the surface and have a Bt horizon that is free of any segregated lime. Clovis soils have an average annual soil temperature of 47° to 59°F. La Lande soils lack argillic horizons and lack calcic horizons within 40 inches of the surface. McAllister soils have less than 45 percent sand in the B2t horizon. Newkirk soils have sandstone bedrock at depths shallower than 20 inches. Penistaja soils lack calcic horizons within 40 inches of the surface and have a mean annual soil temperature ranging from 47° to 59°F. Tucumcari soils have more than 35 percent clay in the control section. Courtland soils have thick A horizons with the upper boundary of the Bt horizons occurring at depths between 17 and 36 inches.

Setting: Redona soils are on smooth nearly level to gently sloping alluvial fans, terraces, and valley slopes. They formed in medium to moderately fine textured calcareous sediments derived mainly from sandstone and shale "redbed" formations. They occur at elevations lower than the High Plains escarpment or remnants of the High Plains. The climate is semiarid continental. At the type location, the mean annual temperature is 59°F., and the average annual precipitation is about 14 inches. The precipitation pattern is characterized by a marked summer maximum occurring as thunderstorms.

Principal Associated Soils: These are the Ima, Montoya, and Quay soils and the competing La Lande and Tucumcari soils. Ima soils lack argillic and calcic horizons. Quay soils lack argillic horizons. Montoya soils have fine textured control sections.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: Rangeland and irrigated cropland. The native vegetation is blue grama, sideoats grama, buffalo grass, tobosa grass, yucca, mesquite, and cholla cacti. Irrigated crops are alfalfa, cotton, feed grains, and broom corn.

Distribution and Extent: East central New Mexico and possibly southwestern Texas. The series is of moderate extent.

Series Established: Quay County (Tucumcari Area), New Mexico, 1969.

National Cooperative Soil Survey
U. S. A.

SOIL INTERPRETATIONS RECORD

SOIL SERIES FILE

REDONA SERIES

(S): 70
TEH. ~~8-76~~ GWA. 7-77
LLIC HAPLARGIDS. FINE-LOAMY. MIXED. THERMIC

REDONA SERIES CONSISTS OF DEEP WELL DRAINED SOILS. THEY FORMED IN SEDIMENTS DERIVED FROM CALCAREOUS SANDSTONE AND
.E OF REDBED FORMATIONS. ELEVATIONS RANGE FROM 4800 TO 5300 FEET. MEAN ANNUAL
PITATION IS 14 TO 16 INCHES. MEAN ANNUAL TEMPERATURE IS ABOUT 60 F. THE FROST FREE SEASON IS 180 TO 195 DAYS.
LLY THE SURFACE LAYER IS REDDISH BROWN SANDY LOAM ABOUT 10 INCHES THICK. THE SUBSOIL IS BROWN CLAY LOAM ABOUT 50
S THICK. THE SUBSTRATUM IS REDDISH BROWN AND PINK CLAY LOAM. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

PTH N.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
[illegible]	FSL. LFS. SL	SM. ML	A-2. A-4	0	100	100	60-90	30-60	15-25	NP-5
-10	L	ML	A-4	0	100	100	85-100	60-75	15-25	NP-5
-60	SCL. CL	SM-SC. SC. CL-ML. CL	A-4. A-6	0	100	100	80-100	35-55	20-35	5-15

PTH N.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
-10	0-15	-	0.6-2.0	0.09-0.15	7.4-7.8	-	LOW	.24	5	3	5-1%	MODERATE	LOW
-10	15-25	-	0.6-2.0	0.15-0.18	7.4-7.8	-	Moderate	.32	5	5	5-1%		
-60	20-35	-	0.6-2.0	0.14-0.21	7.4-8.4	-	MODERATE	.32					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	LOW

SANITARY FACILITIES

PTIC TANK SORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2+%: MODERATE-SEEPAGE.SLOPE
SANITARY LANDFILL RENCH)	SLIGHT
S ITARY LANDFILL (AREA)	SLIGHT
DAILY OVER FOR LANDFILL	~~GOOD~~ FAIR - TOO CLAYEY

CONSTRUCTION MATERIAL

ROADFILL	FAIR-LOW STRENGTH.SHRINK-SWELL
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-TOO CLAYEY

BUILDING SITE DEVELOPMENT

SHALLOW CAVATIONS	SLIGHT
WELLINGS WITHOUT ASEMENTS	MODERATE-SHRINK-SWELL
WELLINGS WITH ASEMENTS	MODERATE-SHRINK-SWELL
SMALL COMMERCIAL UILDINGS	0-4%: MODERATE-SHRINK-SWELL 4+%: MODERATE - SLOPE, SHRINK-SWELL
LOCAL OADS AND STREETS	MODERATE-LOW STRENGTH.SHRINK-SWELL
LAWNS. SCAPING D GOLF FAIRWAYS	SLIGHT

WATER MANAGEMENT

POND RESERVOIR AREA	0-2%: SEEPAGE 2+%: SEEPAGE.SLOPE
EMBANKMENTS DIKES AND LEVEES	~~LOW STRENGTH~~ PIPING
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	FAVORABLE
IRRIGATION	0-1% L: FAVORABLE 1+% L: SLOPE 0-1% FSL.LFS.SL: SOIL BLOWING 1+% FSL.LFS.SL: SLOPE.SOIL BLOWING
TERRACES AND DIVERSIONS	L: FAVORABLE FSL.LFS.SL: SOIL BLOWING
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-DUSTY	PLAYGROUNDS	0-2%: MODERATE-DUSTY 2+%: MODERATE-SLOPE,DUSTY
PICNIC AREAS	MODERATE-DUSTY	PATHS AND TRAILS	MODERATE-DUSTY.

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)		GRAIN SORGHUM (BU)		WHEAT (BU)		PASTURE (AUM)					
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1% FSL	6E	2E		800		7		130		55		12				
1-3% FSL	6E	3E		600		5.5		110		40		10				
3-5% FSL	6E	4E		-		5		85		-		9				
0-1% L	6E	2E		950		7.5		135		65		13				
1-3% L	6E	2E		700		6		115		50		11				
3-5% L	6E	3E		-		5		70		-		9				
0-3% LFS	6E	3E		750		6		95		-		11				
3-5% LFS	6E	4E		-		5		75		-		9				
0-3% LFS,HUMMOCKY	6E	4E		-		5		75		-		9				
ERODED	6E	-														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
0-1% FSL,L,IRR	GOOD	GOOD	GOOD	-	-	GOOD	GOOD	GOOD	GOOD	-	GOOD	-
0-5% LFS,IRR	FAIR	GOOD	GOOD	-	-	GOOD	FAIR	POOR	GOOD	-	FAIR	-
1-3% FSL,L,IRR	GOOD	GOOD	GOOD	-	-	GOOD	GOOD	POOR	GOOD	-	FAIR	-
0-5% NIRR	POOR	FAIR	FAIR	[illegible]	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	FAIR
3-5% FSL,L,IRR	FAIR	GOOD	FAIR	-	-	FAIR	POOR	V. POOR	FAIR	-	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: LFS	FSL	L		
LITTLE BLUESTEM	ANSC2	20	10	-		
BLUE GRAMA	BOGR2	20	30	40		
SAND BLUESTEM	ANHA	5	-	-		
SIDEOATS GRAMA	BOCU	10	5	5		
SAND DROPSEED	SPCR	5	10	5		
THREEAWN	ARIST	5	5	5		
SAND SAGEBRUSH	ARFI2	5	5	-		
OTHER PERENNIAL GRASSES	PPGG	5	5	10		
OTHER ANNUAL FORBS	AAFF	5	5	5		
BLACK GRAMA	BOER4	5	10	5		
YUCCA	YUCCA	5	5	10		
NEW MEXICO FEATHERGRASS	STNE2	-	5	-		
GALLETA	HIJA	-	-	10		
VINE-MESQUITE	PAOB	-	-	5		
OTHER ANNUAL FORBS	AAFF	5	10	5		
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2000	1800	1500		
NORMAL YEARS		1050	950	850		
UNFAVORABLE YEARS		500	400	400		

FOOTNOTES

A ESTIMATES OF ENGINEERING PROPERTIES ARE BASED ON TEST DATA OF 1 PEDON FROM QUAY COUNTY, NEW MEXICO.

Established Series
Rev. MVH/BDS
2/74

REEVES SERIES

The Reeves series is a member of the fine-loamy, gypsic, thermic family of Typic Calciorthids. Typically, Reeves soils have calcareous brown and light brown loam A horizons, light brown clay loam B2ca horizons and pink clay loam Cca horizons over soft, variable colored, calcareous, gypsiferous materials at depth of 31 inches.

Typifying Pedon: Reeves loam - range
(Colors are for dry soil unless otherwise noted.)

A11 0-3"--Brown (10YR 5/3) loam, dark brown (10YR 4/3) moist, weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; calcareous; moderately alkaline; abrupt smooth boundary. (1 to 3 inches thick)

A12 3-7"--Light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; common worm casts; calcareous; moderately alkaline; clear smooth boundary. (3 to 5 inches thick)

B21ca 7-15"--Light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; common fine lime filaments; calcareous; moderately alkaline; clear smooth boundary. (7 to 12 inches thick)

B22ca 15-22"--Light brown (7.5YR 6/4) clay loam, strong brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine and very fine roots; few fine lime filaments; calcareous; moderately alkaline; clear smooth boundary. (5 to 10 inches thick)

C1ca 22-31"--Pink (7.5YR 8/4) clay loam, pink (7.5YR 7/4) moist; massive; slightly hard, very friable, sticky, plastic; few very fine roots; few fine lime mottles; calcareous; moderately alkaline; abrupt wavy boundary. (4 to 10 inches thick)

IIC2cs 31-40"--Pinkish white (7.5YR 8/2) gypsiferous material, pink (7.5YR 7/4) moist; massive; slightly hard, very friable, sticky, plastic; calcareous; moderately alkaline; clear wavy boundary. (6 to 36 inches thick)

IIC3cs 40-64"--Pink (7.5YR 8/4) clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, sticky, plastic; calcareous; moderately alkaline; clear wavy boundary. (10 to 30 inches thick)

IIC4 64-79"--Reddish yellow (5YR 6/6) clay loam, reddish brown (5YR 5/4) moist; massive, hard, friable, sticky, plastic; common gypsum mottles and crystals; 20 to 30 percent carbonate nodules; calcareous; moderately alkaline.

Type Location: Chaves County, New Mexico; about 8 miles southwest of Roswell; 400 feet east and 293 feet south of the northwest corner of the NE1/4 of sec. 11, T.12S., R.25E.

Range in Characteristics: The depth to gypsiferous material ranges from 20 to 40 inches. The solum is moderately or strongly alkaline. Carbonates and gypsum range from 40 to 65 percent in the control section. The annual soil temperature ranges from 59° to 69°F. The A horizon has hue of 7.5YR or 10YR, value of 5 through 7 dry, 4 or 5 moist, and chroma of 3 or 4. The B2 has hue of 5YR through 10YR, value of 5 through 7 dry, 4 through 6 moist and chroma of 3 through 5. It is clay loam or heavy loam and has 18 to 30 percent clay. This horizon has weak or moderate, fine or medium subangular blocky structure. The C1 horizon has hue of 5YR through 10YR, value of 6 through 8 dry, 5 through 7 moist and chroma of 3 through 5. It is massive or has weak subangular blocky structure. The highly gypsiferous materials range from soft to hard with the maximum hardness of about 2.5 or 3 on the Mohs scale. They range in gypsum from 20 to 75 percent. They range widely in color depending on the geologic formation.

Competing Series and their Differentiae: These are the Bracken, Grandfalls, Holloman, Purgatory, Rance, and Russler series. Bracken and Grandfalls soils have less than 18 percent clay in the series control section. Holloman soils are shallower than 20 inches to gypsiferous material. Purgatory soils have a paralithic contact with shale at depths of less than 40 inches. Rance soils have a mesic temperature regime. Russler soils have 2.5YR hue.

Setting: These soils are on nearly level to gently sloping uplands at elevations of 3,000 to 4,500 feet. Slopes are dominantly 0 to 3 percent, but they range up to 9 percent. The parent material is calcareous and medium to moderately fine textured. It is over impure soft and hard gypsum beds. The climate is arid to semiarid with average rainfall of 10 to 13 inches. The driest periods occur between late September and May. The average annual temperature is 60 to 64 F.

Principal Associated Soils: These are the Atoka, Berino, Reakor, Simona, and Upton soils and the competing Holloman and Russler soils. Atoka, Simona and Upton soils have petrocalcic horizons. Berino soils have argillic horizons. Reakor soils lack gypsic mineralogy.

Drainage and Permeability: Well-drained; medium runoff; moderate permeability in the B horizon; permeability in the substratum is variable.

Use and Vegetation: Grazing and irrigated cropland. Crops are mostly cotton, alfalfa, sorghum, and small grains. Vegetation is mainly burro-grass, tobosa, alkali sacaton, blue grama, three-awn, fourwing saltbush, and snakeweed.

Distribution and Extent: Southeastern New Mexico and western Texas. The series is of moderate extent.

Series Established: Reeves County, Texas, 1922.

Remarks: The type location was moved to Chaves County, New Mexico from Reeves County, Texas because it is more extensively distributed in New Mexico. Reeves soils were formerly classified as Calcisols. The gypsum in these soils is considered to be non-pedogenic. Therefore, the soils do not fit in Gypsiorthids.

Additional Data: Reeves series classification characterization; Soil Survey Laboratory, Lincoln, Nebraska; Lab No. 70L364-70L371 and 70L372-70L376.

National Cooperative Soil Survey
U. S. A.

SOIL INTERPRETATIONS RECORD

MLRA(S): 42
REV. MVH,JEH, 11-76
TYPIC GYPSIORTHIDS, FINE-LOAMY, GYPSIC, THERMIC

REEVES SERIES

THE REEVES SERIES CONSIST OF WELL DRAINED, MODERATELY DEEP TO GYPSUM MATERIAL, LEVEL TO MODERATELY SLOPING UPLAND SOILS. TYPICALLY THE SURFACE LAYER IS A LOAM ABOUT 7 INCHES THICK. THE SUBSOIL IS CLAY LOAM ABOUT 24 INCHES THICK. THE SUBSTRATUM IS GYPSUM MATERIAL OF ABOUT 9 INCHES THICK. THE NEXT LAYER TO 79 INCHES IS CLAY LOAM AND GYPSUM MATERIAL. THEY FORMED IN LOAMY ALLUVIUM MATERIAL OVER BEDS OF GYPSUM MATERIAL. ELEVATIONS RANGE FROM 3000 TO 4500 FEET. MEAN ANNUAL PRECIPITATION IS 10 TO 13 INCHES. FROST FREE SEASON IS 200-215 DAYS. SLOPES ARE 0 TO 9 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	L, SIL, VFSL	CL-ML, ML	A-4	0	100	100	90-100	60-75	20-35	NP-10
7-31	CL, SIL	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	20-30	5-15
31-40	L, SIL	ML	A-4	0	100	95-100	80-95	55-75	20-30	NP-5
40-79	CL, SIL	CL, CL-ML	A-6, A-4	0	100	100	90-100	60-80	25-35	5-15

DEPTH (IN.)	CLAY (PCT <2MM)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-7			0.6-2.0	0.16-0.18	7.4-8.4	2-8	LOW	.49	2	4L		HIGH	HIGH
7-31			0.6-2.0	0.19-0.21	7.4-8.4	2-8	MODERATE	.37					
31-40			0.6-2.0	0.05-0.08	7.4-8.4	4-8	LOW	.49					
40-79			0.6-2.0	0.06-0.10	7.4-8.4	4-8	MODERATE	.37					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		C	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS 1	0-8%: MODERATE-PERCS SLOWLY 8+%: MODERATE-SLOPE,PERCS SLOWLY
SEWAGE LAGOON AREAS 1	0-2%: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE,SLOPE 7+%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH) 1	SLIGHT
SANITARY LANDFILL (AREA) 1	0-8%: SLIGHT 8+%: MODERATE-SLOPE
DAILY COVER FOR LANDFILL	0-8%: FAIR-AREA RECLAIM 8+%: FAIR-SLOPE,AREA RECLAIM

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	0-8%: SLIGHT 8+%: MODERATE-SLOPE
DWELLINGS WITHOUT BASEMENTS 2	0-8%: MODERATE-SHRINK-SWELL,LOW STRENGTH 8+%: MODERATE-SLOPE,SHRINK-SWELL, LOW STRENGTH
DWELLINGS WITH BASEMENTS 2	0-8%: MODERATE-SHRINK-SWELL,LOW STRENGTH 8+%: MODERATE-SLOPE,SHRINK-SWELL, LOW STRENGTH
SMALL COMMERCIAL BUILDINGS 2	0-4%: MODERATE-SHRINK-SWELL,LOW STRENGTH 4-8%: MODERATE-SLOPE,SHRINK-SWELL, LOW STRENGTH 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS 2	0-8%: MODERATE-SHRINK-SWELL,LOW STRENGTH 8+%: MODERATE-SLOPE,SHRINK-SWELL, LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

CONSTRUCTION MATERIAL

ROADFILL 2	FAIR-SHRINK-SWELL,LOW STRENGTH,AREA RECLAIM
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	0-8%: FAIR-AREA RECLAIM,EXCESS SALT 8+%: FAIR-AREA RECLAIM,EXCESS SALT,SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA 1	SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	THIN LAYER,HARD TO PACK,PIPING
EXCAVATED PONDS AQUIFER FED	NO WATER
DRAINAGE	0-3%: EXCESS SALT 3+%: SLOPE,EXCESS SALT
IRRIGATION	0-3%: DROUGHTY,EXCESS SALT 3+%: SLOPE,EXCESS SALT,DROUGHTY
TERRACES AND DIVERSIONS	SLOPE,ERODES EASILY
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

RECREATIONAL DEVELOPMENT

CAMP AREAS	0-8%: MODERATE-DUSTY 8+%: MODERATE-SLOPE,DUSTY	PLAYGROUNDS	0-2%: MODERATE-DUSTY 2-6%: MODERATE-SLOPE,DUSTY 6+%: SEVERE-SLOPE
PICNIC AREAS	0-8%: MODERATE-DUSTY 8+%: MODERATE-SLOPE,DUSTY	PATHS AND TRAILS	MODERATE-DUSTY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)		GRAIN SORGHUM (BU)		SORGHUM SILAGE (TONS)		CORN SILAGE (TONS)		BARLEY (BU)		PASTURE (AUM)	
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-1%	7S	3S	-	875	-	6	-	95	-	20	-	16	-	70	-	12
1-3%	7E	3E	-	800	-	5	-	90	-	19	-	15	-	65	-	10
ERODED	7E	3E	-	750	-	4.5	-	85	-	18	-	14	-	60	-	9

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
IRR	ORIENTAL ARBORVITAE	10	ARIZONA CYPRESS	20	SIBERIAN ELM	16	EASTERN REDCEDAR	20
	ROCKY MT. JUNIPER	10	HONEYLOCUST	22	RUSSIAN-OLIVE	20		

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
IRR	FAIR	GOOD	FAIR	-	-	FAIR	V. POOR	V. POOR	FAIR	-	V. POOR	FAIR
NIRR	V. POOR	V. POOR	FAIR	-	-	POOR	V. POOR	V. POOR	POOR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: ALL				
BLUE GRAMA	BOGR2	20				
BURROGRASS	SCBR2	10				
TOBOSA	HIMU2	15				
ALKALI SACATON	SPAI	10				
SIDEOATS GRAMA	BOCU	10				
WINTERFAT	EULA5	5				
BROOM SNAKEWEED 3/	GUSA2	5				
BLACK GRAMA	BOER4	5				
SAND DROPSEED	SPCR	3				
SMALL SOAPWEED 3/	YUGL	2				
MORMON-TEA	EPHED	3				
FOURWING SALTBUSH	ATCA2	2				
OTHER PERENNIAL FORBS	PPFF	5				
OTHER PERENNIAL GRASSES	PPGG	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		800				
NORMAL YEARS		500				
UNFAVORABLE YEARS		300				

FOOTNOTES

A ESTIMATES BASED ON ENGINEERING TEST DATA OF 2 PEDONS 1 EACH FROM CHAVES AND EDDY COUNTIES, NEW MEXICO.
1 GYPSUM MATERIAL WITH VARIABLE PERMEABILITIES, PIPING AND MAY CAUSE POLLUTION TO UNDERGROUND WATER.
2 VARIABLE PERMEABILITY, PIPING, AND SOLUTION OF THE GYPSUM ARE A POTENTIAL LIMITATION.
3 NOT USUALLY UTILIZED BY CATTLE OR SHEEP.

Established Series
Rev. BDS/MVH
2/74

ROSWELL SERIES

The Roswell series is a member of the mixed, thermic family of Ustic Torripsamments. Typically Roswell soils have pink and light brown loose and very friable fine sand A and C horizons.

Typifying Pedon: Roswell fine sand - rangeland
(Colors are for dry soil unless otherwise stated.)

A11 0-5"--Pink (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grained; loose; many very fine roots; many very fine pores; neutral; abrupt smooth boundary. (3 to 6 inches thick)

A12 5-13"--Light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable; many very fine and few coarse roots; many very fine pores; neutral; gradual smooth boundary. (6 to 9 inches thick)

C 13-88"--Pink (7.5YR 7/4) fine sand, light brown (7.5YR 6/4) moist; massive; soft, very friable; many very fine and common coarse roots; neutral.

Type Location: Chavez County, New Mexico; in an area of Roswell-Jalmar complex; 174 feet south and 180 feet west oil well stand pipe in SE1/4 SE1/4 of sec. 6, T.13S., R.31E.

Range in Characteristics: The A and C horizons are more than 60 inches thick. They have hue of 5YR or 7.5YR, value of 6 or 7 dry, 5 or 6 moist, and chroma of 3 through 6. The 10- to 40-inch control section is fine sand or loamy fine sand. It is neutral or mildly alkaline.

Competing Series and their Differentiae: These are the Bluepoint, Brazito, Cajon, Cinco(t), Kermit, Maynard Lake, Moapa, Penwell, Pintura, Toquop, and Yturbide series. Bluepoint, Brazito, Cajon, Cinco, Maynard Lake, Moapa, Pintura, Toquop, and Yturbide soils lack a moisture regime bordering ustic. Kermit and Penwell soils have siliceous mineralogy.

Setting: The Roswell soils are on nearly level to undulating and hummocky upland plains, alluvial fans, and valley side slopes. The soils formed in noncalcareous, deep, sandy material that has often been reworked by wind. Sand dunes, coppice mounds, and blowout areas are common surface features. The climate is arid with a mean annual precipitation of about 12 inches, most of which is received during the summer. Mean annual temperature ranges from about 57° to 70°F.

Principal Associated Soils: These are the Faskin, Jalmar and Malstrom soils. Faskin and Jalmar soils have argillic horizons. Malstrom soils have calcic horizons.

Drainage and Permeability: Excessively drained; very slow runoff; rapid permeability.

Use and Vegetation: Used mainly as native rangeland and for recreation and wildlife. Native vegetation is mainly sand bluestem, sand dropseed, threeawn, sandbur, sandsage brush, shimmery oak, mesquite, and yucca.

Distribution and Extent: Southern New Mexico and southwestern Texas. The series is moderately extensive.

Series Established: Chavez County, New Mexico, 1899. Concept revised 1974.

Remarks: The Roswell soils were originally conceived in the Roswell area during an old survey in the late 19th century. The name has not been used since then nor is there a record to show it has been used in the last 60 or 70 years. The series has been inactive.

Additional Data: 2 pedons, R72 130 and 131, Riverside Lab. 1972.

National Cooperative Soil Survey
U. S. A.

NM0175

SOIL SURVEY INTERPRETATIONS

MLRA(S): 70
REV. MVH, ~~2-76~~ 6-77
USTIC TORRIPSAMMENTS, MIXED, THERMIC

SOIL SERIES FILE

ROSWELL SERIES

THE ROSWELL SERIES CONSIST OF DEEP WELL-DRAINED SOILS. THEY FORMED IN COARSE TEXTURED AEOLIAN AND ALLUVIAL SEDIMENTS ON UPLANDS. ~~SLOPES ARE 1 TO 15 PERCENT.~~ ELEVATION IS 3500 TO 4200 FEET. MEAN ANNUAL PRECIPITATION IS 12 TO 13 INCHES. MEAN ANNUAL SOIL TEMPERATURE IS 59 TO 61 F. FROST-FREE SEASON IS 190 TO 205 DAYS. IN A REPRESENTATIVE PROFILE THE SURFACE LAYER IS PINK AND LIGHT BROWN FINE SAND ABOUT 13 INCHES THICK. THE SUBSTRATUM IS PINK FINE SAND TO 88 INCHES OR MORE. THE PROFILE IS NONCALCAREOUS AND NEUTRAL. SLOPES ARE 1 TO 15 PERCENT

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-88	FS, LFS	SM, SP-SM	A-2	0	100	95-100	70-95	10-30	-	NP

DEPTH (IN)	CLAY (PCT OF <2MM)	MOIST BULK DENSITY (G/CM³)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (pH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
SAME DEPTH AS ABOVE	4-15	-	6.0-20	0.05-0.07	6.6-7.3	-	LOW	.20	5	1	-	LOW	LOW

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		A	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	1-8%: SLIGHT 8+%: MODERATE-SLOPE
SEWAGE LAGOON AREAS	1-7%: SEVERE-SEEPAGE 7+%: SEVERE-SEEPAGE, SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-SEEPAGE, TOO SANDY
SANITARY LANDFILL (AREA)	SEVERE-SEEPAGE
DAILY COVER FOR LANDFILL	POOR-TOO SANDY, SEEPAGE, AREA RECLAIM

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	1-8%: SLIGHT 8+%: MODERATE-SLOPE
DWELLINGS WITH BASEMENTS	1-8%: SLIGHT 8+%: MODERATE-SLOPE
SMALL COMMERCIAL BUILDINGS	1-4%: SLIGHT 4-8%: MODERATE-SLOPE 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	1-8%: SLIGHT 8+%: MODERATE-SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

SOURCE MATERIAL

ROADFILL	GOOD
SAND	FAIR-EXCESS FINES
GRAVEL	UNSUITED
TOPSOIL	POOR-TOO SANDY, AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	1-2%: SEEPAGE 2+%: SEEPAGE, SLOPE
EMBANKMENTS DIKES AND LEVEES	SEEPAGE, ~~ERODES EASILY~~, PIPING
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	FAVORABLE
IRRIGATION	FAST INTAKE, SOIL BLOWING, DROUGHTY
TERRACES AND DIVERSIONS	COMPLEX SLOPE, ERODES EASILY, SOIL BLOWING
GRASSED WATERWAYS	

REGIONAL INTERPRETATIONS

ROSWELL SERIES NM0175

RECREATION

CAMP AREAS	SEVERE-TOO SANDY.SOIL BLOWING	PLAYGROUNDS	1-6%: SEVERE-TOO SANDY.SOIL BLOWING 6+%: SEVERE-TOO SANDY.SOIL BLOWING.SLOPE
PICNIC AREAS	SEVERE-TOO SANDY.SOIL BLOWING	PATHS AND TRAILS	SEVERE-TOO SANDY.SOIL BLOWING

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	7E	-														

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
IRR	ARIZONA CYPRESS HONEYLOCUST		ROCKY MT. JUNIPER SIBERIAN ELM		ORIENTAL ARBORVITAE WHITE MULBERRY		RUSSIAN-OLIVE SKUNKBUSH SUMAC	

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	V. POOR	V. POOR	GOOD	-	-	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
SAND BLUESTEM	ANHA	20				
LITTLE BLUESTEM	ANSC2	10				
INDIANGRASS	SONU2	5				
SIDEOATS GRAMA	BOCU	10				
OTHER PERENNIAL FORBS	PPFF	5				
HALLS PANICUM	PAHA	5				
PLAINS BRISTLEGRASS	SEMA5	5				
HAIRY GRAMA	BOHI2	5				
SHINNERY OAK 1/	QUHA3	17				
YUCCA	YUCCA	3				
OTHER ANNUAL GRASSES	AAGG	5				
SAND DROPSEED	SPCR	5				
OTHER ANNUAL FORBS	AAFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		1800				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		1000				

FOOTNOTES

1 NO SUALLY UTILIZED BY CATTLE OR SHEEP.

Established Series
Rev. ERB:GSM
12/73

SHARVANA SERIES

The Sharvana series is a member of the loamy, mixed, thermic, shallow family of Petrocalcic Ustalfic Paleargids. These reddish brown noncalcareous soils have fine sandy loam A horizons and sandy clay loam Bt horizons overlying indurated caliche within 20 inches of the soil surface.

Typifying Pedon: Sharvana fine sandy loam - native rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-6" -- Reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; hard, friable, slightly sticky; many fine roots; neutral; clear smooth boundary. (4 to 8 inches thick)

B2t -- 6-14" -- Reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic parting to weak fine subangular blocky structure; very hard, friable, sticky, slightly plastic; many fine roots; thin patchy clay films which are slightly darker than crushed soil on prism faces; neutral in the upper part, mildly alkaline in the lower part; abrupt wavy boundary. (4 to 14 inches thick)

Ccam -- 14-24" -- Indurated platy caliche; the upper 2 inches is laminar; the upper surface is smooth; the lower sides of the plates have small pendants of $CaCO_3$ up to 1 cm. long.

Type Location: Midland County, Texas; in native pasture 8.6 miles east of the intersection of Texas Highway 459 and Farm Market Road 307 in Midland, 1.3 miles west of Greenwood School and 100 feet north of Farm Market Road 307.

Range in Characteristics: Solum thickness to indurated caliche ranges from 8 to 20 inches. Some pedons contain a few angular caliche and igneous pebbles. Dry color of the A horizon is reddish brown (5YR 4/3, 4/4, 5/4), or brown (7.5YR 4/4, 5/4). Texture of the A horizon ranges from fine sandy loam through loamy fine sand. Reaction of the A1 horizon ranges from neutral to moderately alkaline inclusive but is noncalcareous. The coarse prismatic structure parts to weak granular or weak subangular blocky. The B2t horizon is brown (7.5YR 4/4, 5/4), reddish brown (5YR 4/3, 4/4, 5/4), or red (2.5YR 4/8, 5/8). Texture ranges from fine sandy loam to sandy clay loam with a clay content of 15 to 30 percent. Reaction ranges from neutral through moderately alkaline. Some pedons are calcareous in the lower part of the Bt horizon. The Ccam horizon ranges from indurated to strongly cemented, and contains a few fractures and solution channels.

Competing Series and their Differentiae: These include Arvana, Cacique, Colorock, Douro, Hueco, Quemado, Skyhaven, and Wickett series. Arvana, Cacique, Douro, Hueco, and Wickett soils have petrocalcic horizons 20 to 40 inches below the surface. Cacique, Colorock, Hueco, and Skyhaven soils are drier for longer periods and are in regions with less than 12 inches of annual rainfall. Quemado soils have mean annual temperature of more than 72° F.

Setting: Sharvana soils occur on nearly level plains. The surface gradient generally is less than 1 percent, but ranges to 3 percent near drainageways. The regolith consists of a thin mantle of loamy soil over a thick bed of caliche. The upper part is indurated or strongly cemented. Climate is semiarid to arid. Average annual precipitation ranges from 11 to 17 inches, Thornthwaite annual P-E indices from 17 to about 24, and mean annual air temperatures from 57° to 70° F.

Principal Associated Soils: These include the competing Arvana, Douro, and Wickett series and the Kimbrough, Slaughter, and Stegall series. Kimbrough, Slaughter, and Stegall soils have mollic epipedons.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: Used mainly for rangeland. Small areas are used for irrigated cotton and grain sorghum. Native vegetation includes black grama, sand dropseed, mesa dropseed, threeawn grasses, and low scattered mesquite shrubs.

USDA-SCS-FORT WORTH, TEX. 1974

Distribution and Extent: Texas and New Mexico. Series is of moderate extent.

Series Established: Ward County, Texas; 1969.

Remarks: The Sharvana series included soils formerly classified as shallow phases of the Aryana series, and the Reddish Chestnut great soil group.

National Cooperative Soil Survey
U. S. A.

TX0223

SOIL SURVEY INTERPRETATIONS

SHARVANA SERIES

MLRA(S): 77, 42
FPB, 12-73
PETROCALCIC USTALFIC PALEARGIDS, LOAMY, MIXED, THERMIC, SHALLOW

THE SHARVANA SERIES CONSISTS OF SHALLOW, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS OF UPLANDS. THE SOIL FORMED IN CALCAREOUS LOAMY MATERIALS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS REDDISH BROWN FINE SANDY LOAM ABOUT 6 INCHES THICK. THE REDDISH BROWN SANDY CLAY LOAM SUBSOIL EXTENDS TO A DEPTH OF 14 INCHES. THE SUBSTRATUM IS INDURATED CALICHE. SLOPES RANGE FROM 0 TO 3 PERCENT.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-6	FSL, LFS	SM, SM-SC	A-2-4, A-4	0	100	100	70-95	30-50	17-25	2-7
6-14	SCL	SC, CL, CL-ML, SM-SC	A-4, A-6	0	100	100	70-95	36-60	20-35	5-18
14-24	IND									

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-6	2.0-6.0	0.11-0.15	6.6-8.4	-	LOW	LOW	LOW	.24	1	3
6-14	0.6-2.0	0.12-0.17	7.4-8.4	-	LOW	MODERATE	LOW	.32		
14-24										

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6			8-20	RIPPABLE	>60		-		C	-

SANITARY FACILITIES (A)

SEPTIC TANK ABSORPTION FIELDS	SEVERE-CEMENTED PAN
SEWAGE LAGOON AREAS	SEVERE-CEMENTED PAN
SANITARY LANDFILL (TRENCH)	SEVERE-CEMENTED PAN
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	POOR-THIN LAYER

COMMUNITY DEVELOPMENT (A)

SHALLOW EXCAVATIONS	SEVERE-CEMENTED PAN
DWELLINGS WITHOUT BASEMENTS	SEVERE-CEMENTED PAN
DWELLINGS WITH BASEMENTS	SEVERE-CEMENTED PAN
SMALL COMMERCIAL BUILDINGS	SEVERE-CEMENTED PAN
LOCAL ROADS AND STREETS	SEVERE-CEMENTED PAN

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (A)

ROADFILL	POOR-THIN LAYER
SAND	UNSUITED
GRAVEL	UNSUITED
TOPSOIL	FAIR-THIN LAYER

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-CEMENTED PAN
EMBANKMENTS DIKES AND LEVEES	SEVERE-THIN LAYER
EXCAVATED PONDS AQUIFIER FED	SEVERE-NO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	ROOTING DEPTH, DROUGHTY
TERRACES AND DIVERSIONS	CEMENTED PAN, ROOTING DEPTH
GRASSED WATERWAYS	ROOTING DEPTH, DROUGHTY

RECREATION (B)

CAMP AREAS	SLIGHT	PLAYGROUNDS	SEVERE-DEPTH TO ROCK
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND PREDICTED YIELDS --- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		GRAIN SORGHUM (BU)		WHEAT (BU)											
	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.	NIRR.	IRR.
ALL	6S	4S		35		20										

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: IMPORTANT TREES	SITE INDX	TREES TO PLANT
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (C)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	V. POOR	FAIR	V. POOR	V. POOR	POOR	-	V. POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (D)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE: SANDY LOAM				
BLUE GRAMA	BOGR2	10				
SIDEOATS GRAMA	BOCU	20				
PLAINS BRISTLEGRASS	SEMA5	5				
BUFFALOGRASS	BUDA	10				
ARIZONA COTTONTOP	TRCA2	5				
BLACK GRAMA	BOER4	20				
VINE-MESQUITE	PAOB	5				
HOODED WINDMILLGRASS	CHCU2	5				
OTHER PERENNIAL GRASSES	PPGG	10				
OTHER SHRUBS	SSSS	5				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		2000				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		1000				

FOOTNOTES

A RATINGS BASED ON "GUIDE FOR INTERPRETATING ENGINEERING USES OF SOILS", NOV. 1971
B RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
C WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972
D SANDY LOAM RANGE SITE
1 RATINGS BASED ON SRWPC COMMITTEE IV GUIDE, DRAFT APR. 1970

Revised Draft

SOIL SERIES FILE

Established Series
Rev. ERB
10/73

SLAUGHTER SERIES

The Slaughter series is a member of the clayey, mixed, thermic, shallow family of ~~Aridic~~ Petrocalcic Paleustolls. These soils have brown loamy A horizons and reddish clay loam Bt horizons that rest on indurated, platy caliche within 20 inches of the soil surface.

Typifying Pedon: Slaughter loam - native rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-5" -- Brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, many roots; mildly alkaline; gradual smooth boundary. (4 to 8 inches thick)

B2t -- 5-15" -- Reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium blocky structure; very hard, firm; nearly continuous thin clay films, few fine roots and fine pores; neutral; abrupt wavy boundary. (5 to 12 inches thick)

Ccam -- 15-24" -- Platy caliche that is indurated and laminar in the upper 2 inches, and strongly cemented in the lower part. The plates are 3 to 8 inches thick and 10 to 24 inches across horizontally. The caliche plates are smooth on upper surfaces and knobby or nodular beneath.

Type Location: Midland County, Texas. 0.45 mile east and 150 feet north of private ranch road from a point 1.8 miles north of Interstate Hwy. 20, from a point 2.3 miles west of the intersection of Hwy. 20 and Farm Market Road 1788 west of the Midland Air Terminal. 0.15 mile north and 0.13 mile west of S. E. corner of sec. 2, Block 41, TSP2-S Survey.

Range in Characteristics: Depth to the Ccam horizon ranges from 9 to 20 inches below the soil surface. ~~[illegible] ranges from reddish brown through brown, hues of 5YR through 10YR [illegible] values are [illegible]~~. The A horizon is mildly alkaline or moderately alkaline but is noncalcareous. The structure is weak or moderate and very fine to medium subangular blocky. ~~The B2t horizon ranges from red through brown in hues of 2.5YR through 7.5YR~~. It is clay loam or clay with clay content ranging from 35 to 45 percent. The structure is moderate or strong and fine or medium blocky. The Ccam horizon ranges from 6 inches to several feet thick, and in hardness from 3 to 5, Moh's scale, in at least the upper 1/2-inch.

Insert 1

Insert 2

Competing Series and Their Differentiae: These include the Kimbrough, Lea, Sharvana, and Stegall series. Kimbrough and Lea soils lack Bt horizons and contain less than 35 percent clay in the control section. Sharvana soils have Bt horizons with less than 35 percent clay and A1 horizons with less than 1 percent organic matter. Stegall soils have sola 20 to 40 inches thick above the petrocalcic horizon.

Setting: Slaughter soils are on upland planes. The surface gradients are mostly less than 1 percent, but ranges to 3 percent near natural drains. The soils have formed in loamy calcareous material. The climate is semiarid to arid, with range in average annual precipitation of about 10 to 18 inches, Thornthwaite annual P-E indices of 14 to about 27, and mean annual air temperature of 57°F to about 70°F.

Principal Associated Soils: These include Kimbrough, Lea, Sharvana, and Stegall soils of the competing series. Amarillo, Arvana and Midessa soils are also associated; these soils have sola more than 20 inches thick.

Drainage and Permeability: Well drained. Moderately slow permeability.

Use and Vegetation: Mainly rangeland with some areas cultivated to irrigated cotton and grain sorghum. Native vegetation includes Tobosa grass, buffalograss, some grama grasses, a few low shrubs, and a thin overstory of small mesquite trees in places.

Distribution and Extent: Texas and New Mexico. Moderately extensive.

ies Established: Andrews County, Texas; 1970.

Remarks: The Slaughter soils were considered a shallow phase of the Stegall series, and were classified in the Chestnut great soil group.

National Cooperative Soil Survey
U. S. A.

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS
[illegible] FORT WORTH, TEX. 1970

Slaughter Series

Insert 1

The A horizon is reddish gray (5YR 5/2), dark reddish gray (5YR 4/2), reddish brown (5YR 5/3, 4/3), brown (7.5YR 5/2, 4/2; 10YR 5/3, 4/3), grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2). It is loam or clay loam.

Insert 2

The B2t horizon is reddish brown (2.5YR 5/4, 4/4; 5YR 5/3,4/3,5/4,4/4), red (2.5YR 5/6, 4/6), yellowish red (5YR 5/6, 4/6) or brown (7.5YR 5/2, 4/2, 5/4, 4/4).

SOIL SURVEY INTERPRETATIONS

MLRA(S) [illegible]
STATE [illegible] RECORD NO. [illegible] AUTHOR(S) ERB DATE 10/73 REVISED ☐ KIND OF UNIT SERIES UNIT NAME SLAUGHTER UNIT MODIFIER
CLASSIFICATION AND BRIEF SOIL DESCRIPTION

THE SLAUGHTER SERIES CONSISTS OF SHALLOW, WELL DRAINED, NEARLY LEVEL TO GENTLY SLOPING SOILS ON UPLANDS. THE SOIL FORMED IN [illegible] LOAMY MATERIALS. IN A [illegible] REPRESENTATIVE PROFILE, THE SURFACE LAYER IS [illegible] LOAM ABOUT 5 INCHES THICK. THE SU[illegible] IS REDDISH BROWN CLAY LOAM ABOUT 10 INCHES THICK. THE SUBSTRATUM TO A DEPTH OF 24 INCHES IS INDURATED TO [illegible] CEMENTED CALICHE. SLOPES RANGE FROM 0 TO 3 PERCENT.

FOOTNOTE

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT. >3 IN. (PCT)	PERCENT OF MATERIAL LESS THAN 3 IN. PASSING SIEVE 4	10	40	200	LIQUID LIMIT
0-5	L, CL	CL, ML	A-6	0	100	100	85-100	55-75	28-40
5-15	CL, C	CL, ML	A-6, A-7-6	0	95-100	95-100	90-100	65-90	35-50
15-24	IND-VAR								

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (pH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	T	WIND EROD. GROUP
SAME DEPTH AS ABOVE	0.6-2.0	0.15-0.20	7.4-8.4	-	MODERATE	MODERATE	LOW	.32	1	1
	0.2-0.6	0.13-0.19	7.4-8.4	-	MODERATE	MODERATE	LOW	.37		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INITIAL (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTEN. FROST ACTION
NONE			> 6			9-20	RIPPABLE	> 60		-		C	-

SANITARY FACILITIES

	FOOTNOTES	
SEPTIC TANK ABSORPTION FIELDS	A	SEVERE-CEMENTED PAN
SEWAGE LAGOONS		SEVERE-CEMENTED PAN
SANITARY LANDFILL (TRENCH)		SEVERE-CEMENTED PAN
SANITARY LANDFILL (AREA)		SLIGHT
DAILY COVER FOR LANDFILL		POOR-THIN LAYER

COMMUNITY DEVELOPMENT

	FOOTNOTES	
SHALLOW EXCAVATIONS	A	SEVERE-CEMENTED PAN
DWELLINGS WITHOUT BASEMENTS		SEVERE-CEMENTED PAN
DWELLINGS WITH BASEMENTS		SEVERE-CEMENTED PAN
SMALL COMMERCIAL BUILDINGS		SEVERE-CEMENTED PAN
LOCAL ROADS AND STREETS		SEVERE-CEMENTED PAN, LOW STRENGTH

REGIONAL INTERPRETATIONS

FOOTNOTES

SOURCE MATERIAL

KEYING ONLY			FOOTNOTES	
FILL	191	ROADFILL	A	SEVERE-THIN LAYER, LOW STRENGTH
SAND	201	SAND		UNSUITED
GRAVEL	211	GRAVEL		UNSUITED
SOIL	221	TOPSOIL		FAIR-THIN LAYER, TOO CLAYEY

WATER MANAGEMENT

KEYING ONLY			FOOTNOTES	
PONDRS	231	POND RESERVOIR AREA	1	SEVERE-CEMENTED PAN
DIKES	241	EMBANKMENTS DIKES AND LEVEES	1	SEVERE-THIN LAYER
PONDAQ	251	EXCAVATED PONDS AQUIFER FED	1	SEVERE-NO WATER
DRAIN	251	DRAINAGE		NOT NEEDED
IRRIG	271	IRRIGATION		ROOTING DEPTH, DROUGHT, SLOW INTAKE
TERRAC	281	TERRACES AND DIVERSIONS		CEMENTED PAN, ROOTING DEPTH
WATERW	291	GRASSED WATERWAYS		ROOTING DEPTH, DROUGHTY

(4)

NAME: SLAUGHTER

MODIFIER: [illegible]

RECREATION

		SEVERITY			FOOTNOTE
AREAS	L: [illegible] STONY CL: [illegible] STONY, TOO CLAYEY	PLAYGR	321	PLAYGROUNDS	[illegible]-DEPTH TO ROCK
C AREAS	L: SLIGHT CL: MODERATE-TOO CLAYEY	PATHS	331	PATHS AND TRAILS	L: SLIGHT CL: MODERATE-TOO CLAYEY

CAPABILITY AND PREDICTED YIELDS-CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		GRAIN SORGHUM (BU.)		WHEAT (BU.)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	4S	4S	15	50	12	25										
	4E	4E	12	45	10	20										

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDEX	
							NONE		

WIND BREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLAND WILDLIFE	WOODLAND WILDLIFE	WETLAND WILDLIFE	RANGELAND WILDLIFE
LL	POOR	POOR	FAIR	-	V.POOR	FAIR	V.POOR	V.POOR	POOR	-	V.POOR	FAIR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
OATS GRAMA	BOCU	10				
ALOGRASS	BUDA	25				
GRAMA	BOGR2	25				
SA	HIMU2	15				
-MESQUITE	PAO3	5				
BLUESTEM	ANBA	5				
	PFGG	10				
	PFFF	5				
AL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS		2000				
NORMAL YEARS		1500				
UNFAVORABLE YEARS		1000				

FOOTNOTES

RATINGS BASED ON "GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS", NOV. 1971

RECREATION RATINGS BASED ON SOILS MEMORANDUM-[illegible], OCT. 19[illegible]

WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972

CLAY LOAM RANGE SITE

RATINGS [illegible] DRAFT [illegible] 1970

SOIL SERIES FILE

Established Series
Rev. ECN:JWF
1/73

TIVOLI SERIES

The Tivoli series is a member of the mixed, thermic family of Typic Ustipsamments. They have pale brown fine sand A horizons and yellow fine sand C horizons.

Typifying Pedon: Tivoli fine sand - rangeland.
(Colors are for dry soil unless otherwise stated.)

A1 -- 0-7" -- Pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; many roots; neutral; gradual smooth boundary. (4 to 10 inches thick)

C -- 7-60" -- Yellow (10YR 7/6) fine sand, brownish yellow (10YR 6/6) moist; single grained; loose; roots decrease as depth incrases; neutral.

Type Location: Woodward County, Oklahoma; about 3-1/2 miles northeast of Woodward; 2000 feet north and 3350 feet west of the southeast corner of Sec. 9. T. 23 N., R. 20 W.

Range in Characteristics: The A horizon is reddish brown (5YR 5/3, 5/4), light reddish brown (5YR 6/3, 6/4), brown (7.5YR 5/4; 10YR 4/3, 5/3), light brown (7.5YR 6/4), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), yellowish brown (10YR 5/4, 5/6), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), or brownish yellow (10YR 6/6). It is slightly acid through mildly alkaline and noncalcareous. It is loamy fine sand or fine sand. Organic matter content is less than 1 percent in the A horizon. The C horizon is reddish brown (5YR 5/3, 5/4), reddish yellow (5YR 6/6, 7/6, 6/8, 7/8), brown (7.5YR 5/4; 10YR 5/3), light brown (7.5YR 6/4), pink (7.5YR 7/4), strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/6, 7/6, 8/6), yellowish brown (10YR 5/4, 5/6), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6), yellow (10YR 7/6) or very pale brown (10YR 7/3, 7/4). It is slightly acid through mildly alkaline in the upper part and neutral through moderately alkaline in the lower part. Some pedons are calcareous below depths of 40 inches. The C horizon is fine sand or sand. Some pedons have AC horizons of fine sand that are slightly acid through mildly alkaline.

Competing Series and their Differentiae: These are the Aline, Arenosa, Eufaula, Goltry, Likes, Lincoln, and Pratt series. Aline, Eufuala, Goltry and Pratt soils have argillic horizons. Arenosa soils have more than 95 percent quartz in the sand fraction. Likes soils are calcareous and have secondary carbonates within 40 inches of the surface. Lincoln soils contain strata finer than loamy fine sand in the control section and have a water table within 5 to 8 feet of the surface during part of the year.

Setting: The Tivoli series consists of undulating to hilly soils of the uplands. Slopes are complex and gradients are about 5 to 30 percent. The Tivoli soils formed in sandy, aeolian sediments. The climate is dry subhumid to semiarid. Average annual precipitation ranges from about 16 to 28 inches; the Thornthwaite P-E index ranges from about 24 to 44; and the mean annual temperature ranges from 57° to about 70° F.

Principal Associated Soils: These are the competing Aline, Goltry, Likes, Lincoln, and Pratt soils and the Carwile, Devol, Enterprise, Grandfield, Miles, Nobscot, Shellabarger, and Springer soils. Carwile soils have argillic horizons and occur on concave areas. Devol, Grandfield, Miles, Nobscot, Shellabarger, and Springer soils have argillic horizons and occur mainly on less sloping areas adjacent to the Tivoli soils. Enterprise soils have control sections finer than loamy fine sand and occur on less sloping areas adjacent to the Tivoli soils.

Drainage and Permeability: Excessively drained; very slow runoff; rapid permeability.

Use and Vegetation: Used for range. Native vegetation is sand bluestem, sand dropseed, and sand reedgrass. Sandsage brush and skunk brush are woody invaders. Shin oak occurs on a small part.

Distribution and Extent: Western Oklahoma, southwestern Kansas, northwestern Texas, and eastern New Mexico. The series is extensive.

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS
USDA SCS-FORT WORTH, TEX. 1973

Tivoli Series

Series Established: Major County, Oklahoma; 1936.

Remarks: The Tivoli soils were formerly classified in the Regosol great soil group.

National Cooperative Soil Survey
U. S. A.

CK0093

SOIL SURVEY INTERPRETATIONS

MLRA(S): 72, 77, 78, 79, 80
JWF, 1-73
TYPIC USTIPSAMMENTS, MIXED, THERMIC

TIVOLI SERIES

DEEP, EXCESSIVELY DRAINED, RAPIDLY PERMEABLE SOILS ON UPLANDS. THESE SOILS HAVE PALE BROWN FINE SAND SURFACE LAYERS. THE UNDERLYING MATERIAL IS YELLOW FINE SAND. SLOPES ARE 5 TO 30 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	LFS, FS	SM, SP-SM	A-2, A-3	0	100	98-100	80-100	5-35	-	NP
7-60	FS, S	SM, SP-SM	A-2, A-3	0	100	98-100	80-98	5-20	-	NP

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-7	6.0-20.0	.05-.11	6.1-7.8	-	LOW	LOW	LOW	.17	5	1
7-60	6.0-20.0	.02-.06	6.1-8.4	-	LOW	LOW	LOW			

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6			-		>60		-		A	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	MODERATE-SLOPE
SEWAGE LAGOONS	SEVERE-PERCS RAPIDLY, SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-PERCS RAPIDLY, TOO SANDY
SANITARY LANDFILL (AREA)	SEVERE-PERCS RAPIDLY
DAILY COVER FOR LANDFILL	LFS: POOR-THIN LAYER, TOO SANDY FS: POOR-TOO SANDY

COMMUNITY DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE, TOO SANDY
DWELLINGS WITHOUT BASEMENTS	MODERATE-SLOPE
DWELLINGS WITH BASEMENTS	MODERATE-SLOPE
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE
LOCAL ROADS AND STREETS	MODERATE-SLOPE

REGIONAL INTERPRETATIONS

SOURCE MATERIAL (B)

ROADFILL	GOOD
SAND	FAIR
GRAVEL	UNSUITED-EXCESS FINES
TOPSOIL	POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-PERCS RAPIDLY
EMBANKMENTS DIKES AND LEVEES	SEVERE-UNSTABLE FILL, PERCS RAPIDLY, PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-DEEP TO WATER
DRAINAGE	NOT NEEDED
IRRIGATION	COMPLEX SLOPE, ERODES EASILY, DROUGHTY
TERRACES AND DIVERSIONS	COMPLEX SLOPE, ERODES EASILY, FAST INTAKE
GRASSED WATERWAYS	ERODES EASILY, DROUGHTY, PERCS RAPIDLY

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS

RECREATION (C)

CAMP AREAS	SEVERE-TOO SANDY,DUSTY	PLAYGROUNDS	SEVERE-TOO SANDY,DUSTY
PICNIC AREAS	SEVERE-TOO SANDY,DUSTY	PATHS AND TRAILS	SEVERE-TOO SANDY,DUSTY

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	7E															

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	POOR	FAIR	-	-	POOR	V. POOR	V. POOR	POOR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION) (E)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
LITTLE BLUESTEM	ANSC2	25				
SAND BLUESTEM	ANHA	20				
SAND LOVEGRASS	ERTR3	5				
BIG SANDREED	CAGT3	10				
SCRIBNER PANICUM	PASC5	5				
TEXAS BLUEGRASS	POAR	10				
SAND DROPSEED	SPCR	5				
PERENNIAL LESPEDEZAS	LESPE	5				
OTHER PERENNIAL FORBS	PPFF	5				
OTHER PERENNIAL GRASSES	PPGG	5				
OTHER TREES	TTTT	5				

POTENTIAL PRODUCTION (LBS./AC. DRY WT):					
FAVORABLE YEARS	2000				
NORMAL YEARS	1400				
UNFAVORABLE YEARS	1000				

FOOTNOTES

A ESTIMATES BASED ON OKLAHOMA HIGHWAY DEPARTMENT TEST DATA FROM WOODWARD AND JACKSON CO.
B RATINGS BASED ON GUIDE FOR INTERPRETING ENGINEERING USES OF SOILS, NOV. 1971.
C RECREATION RATINGS BASED ON SOILS MEMORANDUM-69, OCT. 1968.
D WILDLIFE RATINGS BASED ON SOILS MEMORANDUM-74, JAN. 1972.
E RANGE SITE IN OKLAHOMA: DUNE.
1 RATINGS BASED ON SRWPC COMMITTEE 4 GUIDE, APR. 1970.

Established Series
Rev. DNC/JBC
2/77

YTURBIDE SERIES

The Yturbide series consists of deep, excessively drained soils that formed in alluvial sediments derived from mixed rocks. Yturbide soils are on alluvial fans along arroyos and in aggraded stream channels in broad valley floors. The mean annual precipitation is about 10 inches and the mean annual air temperature is about 60°F.

Taxonomic Class: Mixed, thermic Typic Torripsamments.

Typical Pedon: Yturbide loamy sand - rangeland. (Colors are for dry soil unless otherwise noted.)

A1--0 to 8 inches; brown (7.5YR 5/4) loamy sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable; common fine and very fine roots; many fine and very fine interstitial pores; about 10 percent fine gravel; neutral; clear wavy boundary. (4 to 20 inches thick)

C1--8 to 21 inches; brown (7.5YR 5/4) gravelly loamy sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable; common fine and very fine roots, many fine and very fine interstitial pores; approximately 20 percent fine gravel; neutral; clear wavy boundary. (8 to 20 inches thick)

C2--21 to 30 inches; strong brown (7.5YR 5/6) gravelly coarse sand, brown (7.5YR 4/4) moist; massive; soft, very friable; few very fine roots; many fine and very fine interstitial pores; approximately 25 percent fine gravel; neutral; clear wavy boundary. (0 to 20 inches thick)

C3--30 to 60 inches; same as horizon above except it contains segregated lime in thin, faint thread-like veins; matrix noncalcareous.

Type Location: Hidalgo County, New Mexico; 500 feet southeast of NW corner sec. 16, T.22S., R.17W.

Range in Characteristics: The 10- to 40-inch section is gravelly loamy fine sand or coarser, but contains more than 10 percent silt plus clay. Rock fragments in the control section range from 15 to 35 percent. These soils are dry in all parts of the moisture control section more than 3/4 of the time that the soil temperature is above 41°F.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4. It has less than .5 percent organic carbon.

The C1 horizon has hue of 5YR through 10YR, value of 5 or 6 dry and 4 or 5 moist, chroma of 3 or 4. It ranges from noncalcareous to weakly calcareous.

The remaining C horizons are similar to the C1 horizon in hue, but vary widely in value and chroma due to inherent colors of mineral grains and varying amounts of segregated lime. These horizons are typically stratified loamy sand, gravelly loamy sand, sand, or gravelly sand. The lime content is usually less than 5 percent and the lime is segregated or disseminated.

Competing Series: These are the Bluepoint, Brazito, Cajon, Kermit, Maynard Lake, Moapa, Pintura, and Toquop series. Bluepoint, Brazito, Cajon, Pintura, and Toquop soils average less than 15 percent rock fragments in the 10- to 40-inch control section. Also, Brazito and Pintura soils have less than 10 percent silt plus clay in the control section. Kermit soils have siliceous mineralogy. Maynard Lake soils have more than 19 percent pyroclastics in the control section. Moapa soils have bedrock at depths of 20 to 40 inches.

Geographic Setting: The Yturbide soils are on alluvial, side and terminal fans along arroyos and in aggraded stream channels in broad valley floors. The fans have complex slopes of 1 to 5 percent. The aggraded stream channels have a general overall gradient of about 1 percent with convex sideslopes of 1 to 5 percent. Yturbide soils are at elevations of 3500 to 6000 feet. The soils formed in poorly sorted, gravelly coarse textured alluvial sediments derived from mixed rocks. These sediments are valley filling materials between hills and mountains. Mean annual rainfall is about 10 inches with a summer maximum. The mean annual temperature is about 60°F. The Thornthwaite P-E Index is about 14.

Geographically Associated Soils: These are the competing Bluepoint soils and the Canutio, Hondale, Sonoita, Vekol, and Yana soils. Canutio soils have control section textures of very gravelly loam and very gravelly sandy loam. Hondale, Sonoita, and Vekol soils have B2t horizons. Yana soils have control section textures of gravelly loam and gravelly sandy loam.

Drainage and Permeability: Excessively drained; very slow runoff; rapid permeability.

Use and Vegetation: Used primarily as native rangeland. The native vegetation is sand dropseed, Mormon tea, yucca, and mesquite.

Distribution and Extent: The series is moderately extensive in southern New Mexico.

Series Established: Hidalgo County, New Mexico, 1973.

National Cooperative Soil Survey
U.S.A.

SOIL SURVEY INTERPRETATIONS

YTURBIDE SERIES

MLRA(S): 42
REV. 5-73
TYPIC TORRIPSAMMENTS, MIXED, THERMIC

THE YTURBIDE SERIES CONSISTS OF DEEP EXCESSIVELY DRAINED SOILS. THEY FORMED IN ALLUVIUM ON ALLUVIAL FANS. SLOPES ARE COMPLEX AVERAGING 1 TO 8 PERCENT. ELEVATIONS RANGE FROM 3800 TO 6000 FEET. MEAN ANNUAL PRECIPITATIONS IS 7 TO 12 INCHES. MEAN ANNUAL AIR TEMPERATURE IS 58 TO 68 F. AND THE FROST FREE SEASON IS 190 TO 220 DAYS. TYPICALLY THE SURFACE LAYER IS A BROWN LOAMY SAND ABOUT 8 INCHES THICK. UNDERLYING LAYERS AND THE SUBSTRATUM ARE GRAVELLY LOAMY SAND AND GRAVELLY SAND.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLAS-TICITY INDEX
0-8	LS, FS	SM	A-1, A-2	0	80-95	75-90	40-70	15-30	-	NP
8-21	GR-LS	SP-SM, SM	A-1, A-2	0	65-80	60-75	35-55	10-20	-	NP
21-60	GR-S	SP-SM, SM	A-1	0-5	60-80	55-75	30-50	5-15	-	NP

DEPTH (IN.)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP
0-8	2.0-6.0	0.06-0.08	6.6-7.8	<2	LOW	LOW	LOW	.20	5	2
8-21	6.0-20	0.04-0.06	6.6-7.8	<2	LOW	LOW	LOW	.17		
21-60	6.0-20	0.04-0.06	7.4-7.8	<2	LOW	LOW	LOW	.17		

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		A	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SLIGHT
SEWAGE LAGOON AREAS	1-7%: SEVERE-SEEPAGE 7+%: SEVERE-SEEPAGE, SLOPE
SANITARY LANDFILL (TRENCH) 1	SLIGHT
SANITARY LANDFILL (AREA) 1	SLIGHT
DAILY COVER FOR LANDFILL	FAIR-TOO SANDY

COMMUNITY DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4+%: MODERATE-SLOPE
LOCAL ROADS AND STREETS	SLIGHT

REGIONAL INTERPRETATIONS

SOURCE MATERIAL

ROADFILL	GOOD
SAND	FAIR-EXCESS FINES
GRAVEL	POOR-EXCESS FINES
TOPSOIL	POOR-TOO SANDY

WATER MANAGEMENT

POND RESERVOIR AREA	1-7%: SEEPAGE 7+%: SEEPAGE, SLOPE
EMBANKMENTS DIKES AND LEVEES	SEEPAGE, PIPING, ERODES EASILY
EXCAVATED PONDS AQUIFIER FED	NO WATER
DRAINAGE	0-3%: FAVORABLE 3+%: SLOPE
IRRIGATION	0-3%: ERODES EASILY, DROUGHTY, SEEPAGE 3+%: SLOPE, ERODES EASILY, SEEPAGE
TERRACES AND DIVERSIONS	ERODES EASILY, TOO SANDY, PIPING
GRASSED WATERWAYS	DROUGHTY, ERODES EASILY

RECREATION

CAMP AREAS	MODERATE-TOO SANDY,SOIL BLOWING	PLAYGROUNDS	1-2%: MODERATE-TOO SANDY,SOIL BLOWING 2-6%: MODERATE-SLOPE,TOO SANDY,SOIL BLOWING 6+%: SEVERE-SLOPE
PICNIC AREAS	MODERATE-TOO SANDY,SOIL BLOWING	PATHS AND TRAILS	MODERATE-TOO SANDY,SOIL BLOWING

CAPABILITY AND PREDICTED YIELDS -- CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY		COTTON LINT (LBS)		ALFALFA HAY (TONS)		PASTURE (AUM)		GRAIN SORGHUM (BU)							
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	7E	4E	-	900	-	5	-	14	-	70						

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
		EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	IMPORTANT TREES	SITE INDX	
							NONE		

WINDBREAKS

CLASS-DETERMIN'G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
IRR	ARIZONA CYPRESS	28	RUSSIAN-OLIVE	27	ORIENTAL ARBORVITAE	18	HONEYLOCUST	30

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
NIRR	V. POOR	POOR	POOR	--	-	V. POOR	V. POOR	V. POOR	POOR	-	V. POOR	POOR
IRR	FAIR	POOR	POOR	-	--	V. POOR	V. POOR	V. POOR	FAIR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

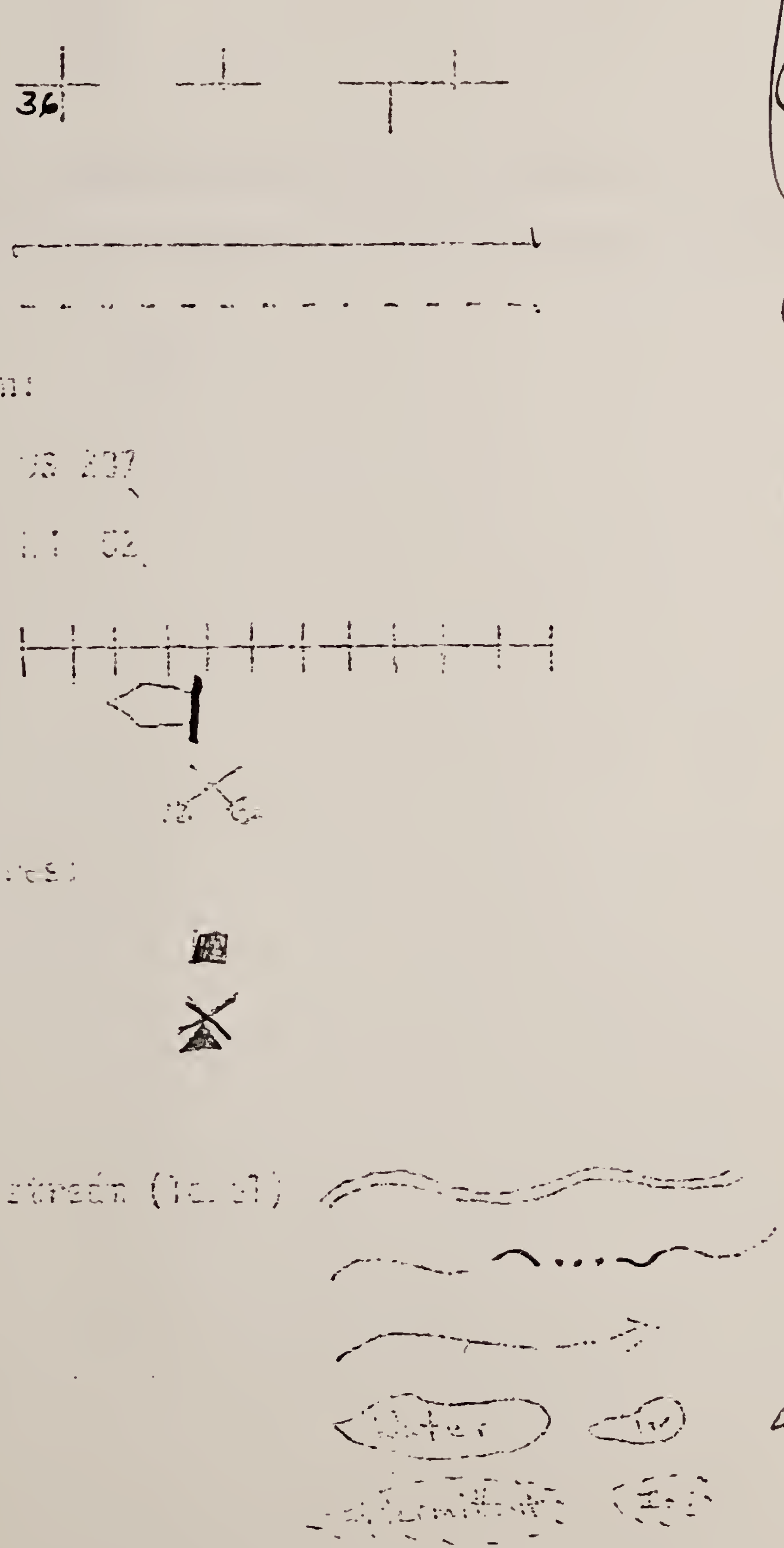
COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				
		ALL				
BLACK GRAMA	BOER4	25				
GIANT DROPSEED	SPGI	10				
SAND DROPSEED	SPCR	10				
MESA DROPSEED	SPFL2	10				
BUSH MUHLY	MUPO2	5				
BROOM DALEA	DASC2	5				
FOURWING SALTBUSH	ATCA2	5				
SAND SAGEBRUSH 2/	ARFI	10				
SOAPTREE YUCCA 2/	YUEL	5				
OTHER PERENNIAL GRASSES	PPGG	10				
OTHER PERENNIAL FORBS	PPFF	5				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		550				
NORMAL YEARS		350				
UNFAVORABLE YEARS		200				

FOOTNOTES

1 MOVEMENT OF LEACHATE IS NOT CONSIDERED A LIMITATION IN THESE SOILS.

2 NOT USUALLY UTILIZED BY CATTLE AND SHEEP.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND



		Pen Size
Boundaries:		
Reservation	(Label)	2
County		2
Limit of soil survey (label)		1
Field sheet match line		1
State Coordinate Tick:		
Land division corners	36	00
Roads:		
Good motor road		2
Poor motor road		2
Road Emblems and Designation:		
Federal	US 287	00
State	MT 52	00
Railroad (label)		00
Dams or stockwater		2
Gravel or caliche pit		2
Miscellaneous culture features:		
Headquarters		00
Windmill		00
Water Features:		
Perennial double line stream (label)		00
Intermittent drainage		00
Drainage end		00
Perennial pond	Water	00
Intermittent pond		00

Spring	~—○
Well, irrigation	—○~
Gully	~~~~~~~~

Spot Symbols: 1/

Soil Sample site	Ⓢ
Gravelly spot	∘∘
Rock outcrop	∨
DUNE LAND	Φ
Severely eroded spot	≑

1/ One spot symbol represents 10 acres in order 3 surveys, and 5 acres in order 2 surveys.